

SUPREMACY SUMMER ISSUE!

Radio Control
CAR ACTION

SEPTEMBER 1990
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**PROJECT
INDY**



THE WORLD'S PREMIER R/C MAGAZINE

RAGIN' RADIANT

**FOOT
SOLDIER**

**SMOKIN'
TRC LYNX II**

**ASSOCIATED'S
THREE-PIECE RIMS**

**'MAGIC'
INTERVIEW:
JOEL JOHNSON
'FESSES UP!**

**PRO-LINE
JR-X2
CONVERSION**



**KYOSHO
FERRARI F-1**



USA \$3.50 Canada \$3.95



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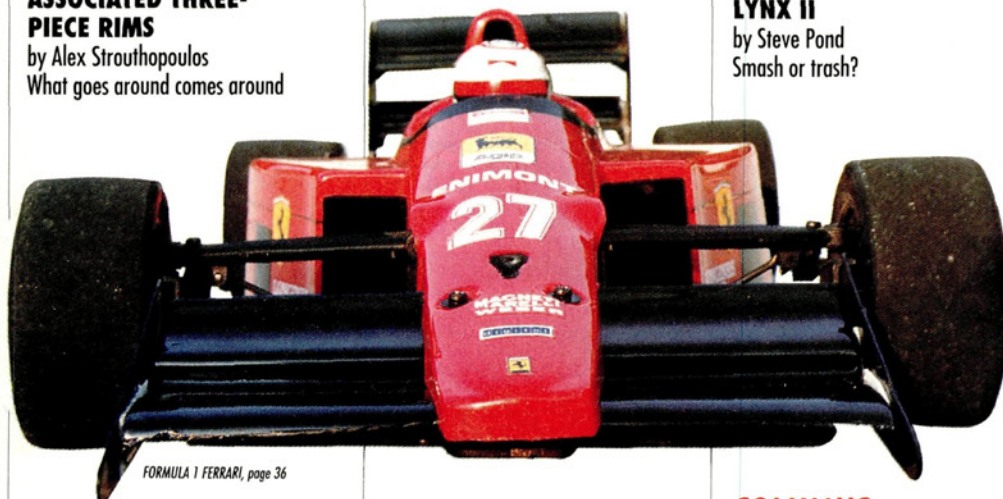
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ON THE COVER: Center: Joel Johnson gives way under interrogation. Top left: Chris Diedling's Indy-bodied Lynx. Top right: "Bad Brain" O'Brien's Foot Soldier. Below from left: Hobby Dynamics' Cesa electric fast boat; Dan Gullickson's monster hot-rod Blackfoot; Kyosho's F-1 Ferrari. Bottom: Front view of Kyosho's scale, detailed Ferrari. (Joel Johnson photo by Chris Chianelli; all others by Steve Pond.)

EDITORIAL

by STEVE POND



IS R/C RACING becoming too expensive? Yes, and as racers, we have ourselves to blame. When we see the invitational or pro drivers running at the speed of light, we try to justify the difference between their speeds and our lackluster performances by saying it must be the "trick" stuff on their cars that makes them so fast (we never believe that it's their driving).

Our next step is to cry foul because we can't get these parts. Well, it seems that our wishes have been granted, because many manufacturers are putting these parts into production. Our problem now is that we all invest exorbitant sums in our cars to keep up with the guys who have the "trick stuff."

Don't take this the wrong way: I like going fast just as much as the next guy, and there will always be a place for this type of "no-holds-barred" racing; it's called the "modified class." You can spend as much, or more, however, on a stock-class car as you do on a modified! With the exception of their motors, the same rules (or lack thereof) apply to both classes, on-road or off-road, and those who have raced in both classes know that a modified-class motor lasts about 10 times longer! So where are the savings?

I propose the introduction of a spec class similar to the very popular full-scale SCCA Spec Class (their most popular class by a *long shot*) in which you buy a car and race it as it's supplied. Modifications aren't allowed, so the emphasis is on fine-tuning your car rather than spending big bucks to get into the winners' circle.

We need a set of strict guidelines for the chassis (on-road or off-road), motors, gearings, batteries and electronics—slanted toward the economic side of things. Never having to buy more than a spec replacement part, racers could enjoy the competition they do now, but it would be slightly slower and much less expensive.

It's a function of simple economics: there's a direct relationship between cost and participation. The less it costs to head for the track every weekend, the more people will be involved, and vice versa. If you have any comments or ideas let me know; I'd be interested to hear them. ■

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LETTERS

We welcome your comments and suggestions. Letters should be addressed to "Letters," *Radio Control Car Action*, 251 Danbury Road, Wilton, CT 06897. Letters may be edited for clarity and brevity. We regret that, owing to the tremendous numbers of letters we receive, we cannot respond to every one.

MAXIMIZING

Your magazine is the best! I'm a proud owner of a Maxxum FF and would love to enhance its performance. I've started with an NESC-T4 Novak ESC, a Dahm's (very versatile) Warrior body, a wing and a set of DuraTrax Super Spike tires, and I'll soon add ball bearings. I've been trying to follow Dick Brinton's excellent articles in your August and September '89 issues, but I'm having problems.

First, I didn't understand which Kyosho ball diff you used to replace the one on the original Maxxum, so I used an Ultima ball diff—a big mistake! It

didn't work at all and was a waste of money. Could you please tell me which one you used? Second, is it possible to install a Hyperdrive in the Maxxum? I think I read in one of your articles that many after-market products for the Ultima would fit in the Maxxum. Is that the correct Hyperdrive to buy?

GEORGE W. HORTA III
Hightstown, NJ

Unfortunately, George, the Ultima diff is the right one as far as fit is concerned, but in application, it's wrong. When power is applied to the FWD Maxxum, some of the weight is transferred to the rear, and the diff spins one front wheel or the other, depending on which has less weight on it. Dick Brinton encountered the

same problem with the stock gear diff. You should tighten your ball diff so there's very little differential action—almost like positraction (no diff at all). The Maxxum was a failure for off-road; it particularly loses it on jumps. Dick has taken third place in the 4WD Oval Class, though. Forget the Hyperdrive. I don't think it would fit, and even if it did, it isn't worth it for this car.

CC

BROKEN AXLES

I have a question about the Project Blackfoot that was in your Monster Truck Special. You used a Thorp diff with Thorp axles and aluminum wheels, right? Well, in the Thorp catalogue, it says that this combination isn't advisable. I planned to get both for my truck, but now I'm not

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FLASH

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Mike Hogue wins IEDA Winter Nationals.
Has 1.91-second run with his Astro Top Fuel II-powered Hogue Illusion.

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sure. Who's right: you or Thorp?

GREG DEFLORIO
Houston, TX

Like the originals, the Thorp axles have a hole drilled through them for the pin that holds the axle and the drive hubs in place. Sees aluminum wheels don't require the use of a drive hub; they are simply mounted up against the pin that passes through the axle. The hole where the pin passes through is a weak point in the design, and it's prone to breaking, especially when used with aluminum wheels. The setup I used for Project Blackfoot is still intact, and I haven't had any problems. Thorp also offers a new, solid axle for the Blackfoot; instead of a hole, it has a machined hub that is

clamped around the axle. Its shape is similar to that of the original Tamiya hubs. The design allows you to use any stock wheels, but it won't work with aluminum wheels. So, you can get the stronger axles with the stock wheels, or risk breakage with the pinned axles and aluminum wheels.

SP

FLYIN' EYE

I saw a mini on-board video camera on the "David Letterman Show," and I want to buy one for my Big Brute. My friends and I came up with a way to mount a Magnavox home videocamera on it, but it was too heavy, and the shocks compressed all the way. My motor was burnt to a crisp after a few very slow runs, and the Brute was so unbalanced that it

flipped very easily on turns and broke the microphone every time. Could you help me find one that will work?

TOM KOWALSKI
Tallahassee, FL

I don't know how much money you want to spend, but if the sky's the limit, your best bet is to try a large security company. Some sell surveillance equipment, e.g., mini microphones, telephone bugs and, of course, mini videocameras—not the new 8mm size; we're talking a lens the size of a pencil eraser! I'm not sure what has to be connected to this little lens, but if there's anyone who can steer you in the right direction, it's a specialty security company.

SP

(Continued on page 18)

POWER MONSTER

Power is the only thing Monster trucks understand. And Team Astro speaks their language. Ten super power cobalt magnets, a skewed seven slot armature, twelve turns of 22 gauge wire, an oversize commutator, oversize brushes, and adjustable timing.

They all spell FULL PULL POWER.

RECORDS ARE FALLING

Team Astro Pullmaster motors are powering Monster trucks to new records at NARCTPA truck pulls all over the midwest. The reasons are many but they all boil down to one thing...the Team Astro Pullmaster Cobalt Motor delivers a full pull every time.



NO NEED TO BE LEFT BEHIND

See your favorite hobby dealer TODAY and ask for the Team Astro Pullmaster Cobalt motor.

◆◆◆◆◆ FLASH! ◆◆◆◆◆

World Records at NR/CTPA World Championships

On October 14th & 15th
TWO WORLD RECORDS were set
using Team Astro PULLMASTER motors
2WD Open I: 203 lbs.
1ST PLACE: Charles Allen
2WD Open II 350 lbs.
1ST PLACE: Gary Kmit -



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INSIDE SCOOP

by CHRIS CHIANELLI

The R/C car industry is rapidly advancing, with new products being offered at a head-spinning rate. So, I'll make manufacturers nervous, but feed you R/C squirrels who are hungry for info, by bringing you a special report on security leaks and "late-in" items. Here goes!

"C" is for COOL



This Group C Nissan is just one of a planned scale series that will be coming from Kyosho. Don't those people ever sleep?! A Group C Toyota, a 300 ZX and a Porsche 928 will follow, and they will be on the new F-1 chassis.

MAGNUM THUNDER

I'm happy to announce that Futaba has added its name to the Car Action/Thunderdrome extravaganza.

Futaba

Futaba will supply all necessities for the Futaba Amateur Challenge: pit area, AC power, chairs,

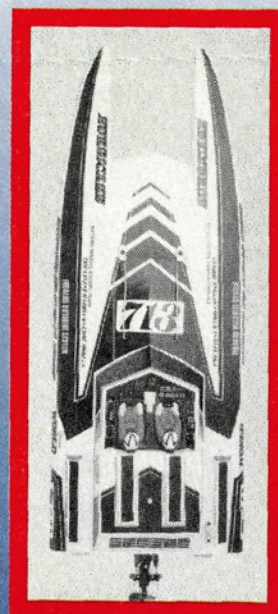
RC THUNDERDROME®

40x60-foot tent, gift certificates and much more! Futaba always did have insight.



Monster Beans Spilleth Over

JUST IN! An accidental and, as yet, unsubstantiated, leak is that Associated is working on a secret monster-truck project. We're not sure if it's an all-new creation or a conversion for the RC10. I wonder if it will be called the RC10X-T Outlaw?



"HURRYCANE"

Kyosho's Hurricane is the newest stablemate of its Jet Stream. This 31-inch offshore catamaran is powered by the same twin-motor surface drive as the Jet Stream, and it packs two LeMans 360STs. I hope a Hurricane GP-10 with a pull-start O.S. 10 is in the works to pair off with the Jet Stream GP-10. Excuse me; I forgot we're talking about Kyosho: it's probably already done.

MRC ALL WET?

Tamiya importer MRC offers another electric water wedge—the Nordic Deep Vee Turbo. According to MRC, this racer features a wet-magnet motor that's skewed and balanced. The 29-inch Nordic uses one or two 7.2V packs, and the brass, helical, gear transmission will accept two motors. MRC claims that the Nordic is "the hottest thing on the waterfront." I guess we'll have to see if the claim is well-founded.

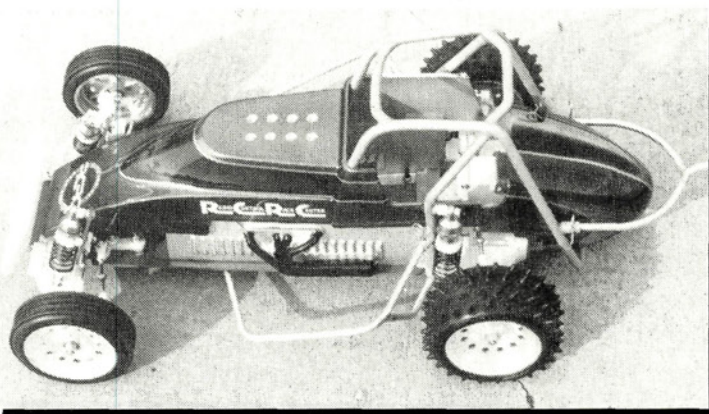


Beating Rush Hour

You think rush hour is a problem in America? You ain't seen traffic until you've experienced Japanese gridlock; we're talking three layers high! This is Mr. Suzuki, owner of Kyosho, waving goodbye to his wife at his country home as he gets ready to reduce commuting time substantially by cutting through the woods to work.

SPRINTING BULLET

It seems that Cliff Fisher ("Mr. RCRC") felt the Traxxas Bullet was worthy of competition, so he decided one of his famous sprint-car conversions was in order. As an off-roader, the Bullet is overweight, but it comes closer to the ROAR legal limit for sprint cars. Watch for the conversion.

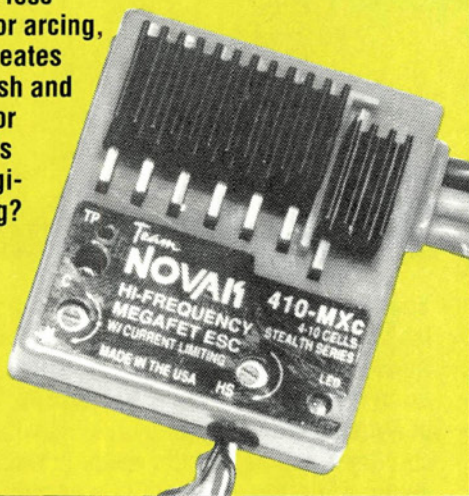


Just in from the Isle of Nippon

From Japan, Big Bill Jeric from Great Planes just sent me this photo of Kyosho's prototype Outlaw Ultima Truck. No details on this racing truck yet, but we'll be first with the info while the other so-called mags are counting sheep.

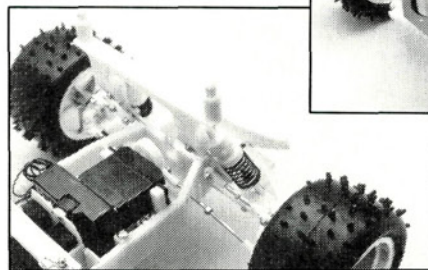
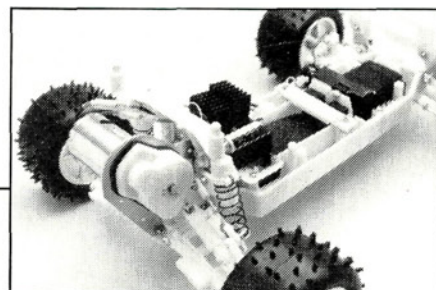
"CURRENT INFORMATION"

Not content to rest on its laurels, Team Novak has developed these two Hi-Frequency Series controllers, which use high-frequency pulse-width modulation (PWM) to provide smoother linear response. The more efficient high-frequency power delivery also produces longer run times with less commutator arcing, and this creates longer brush and commutator life. What's next?—digital steering?



TRX-T Jr.?

Here are a few photos of the Traxxas prototype Hawk, which is the little brother of the TRX-T Eagle. With heavy-duty turnbuckles, telescopic half-shafts and adjustable shocks, this economy racing truck will be priced at \$155 retail, and this means it can be bought for even less, after discounts—a righteous price!



Keeping the industry BUGGED; I'll see you next time—or sooner, if I catch you in my spyglass! CC

RADIO ACTIVE

Take charge of the track with JR! JR quality and popular Max style have been combined to create the brand new Max 2 channel radio system for the ultimate in racing control. Features include ABC&W™ receiver with BEC, 2 JR 507 sport servos, BEC switch harness, new multi-tilt racing type short stick system, battery case, interchangeable frequency crystals (27 MHz), servo reverse and computer designed transmitter case. JR's exclusive ergonomic "Bio-Shape" grips fit the human hand for great racing comfort! Off-road or on, JR radios leave the competition in the dust! Great for R/C boat enthusiasts too!

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READERS' RIDES

Welcome to Readers' Rides. This is our way of giving recognition to the unique, innovative—and sometimes bizarre—vehicles that our readers have created. If you want to join the growing ranks of Readers' Rides winners, send us a sharp, uncluttered, well-exposed color photo (no Polaroids, please!) of your car or truck, along with a brief description. Who knows? The Ayatollah of Radio Controlla might pick your car.

If your ride is chosen, you'll receive a one-year subscription to *Car Action*, or we'll extend your existing one. You'll also be eligible for the second annual "Readers' Ride Car of the Year Contest" in the fall of 1990. Send your photos to Readers' Rides, R/C Car Action Magazine, 251 Danbury Rd., Wilton, CT 06897. Be sure to include your address and phone number, in case we need to contact you!



TURBO TWO-STROKE

Check out the awesome handiwork of Mike Lecza (of Guilford, CT)! His Turbo Burns is built to boogie and powered by a rip-snorting O.S. .21 EX-ABC. With a heavy-duty suspension and large-volume shocks to smooth the ride, this 1/8-scale car moves easily over rough terrain. With this potent powerhouse under his control, Mike's sure to be the center of attention at any track!

REALLY QUICK PIZZA!

A. E. Nickl Jr. built this Red Baron Pizza special racing machine, and he sent us a photo all the way from Kamuela, HI. With basically stock equipment, A. E. says he has a lot of fun with his Bolink Eliminator 10. The incredible paint and detailing job should make him a favorite in any concours!



FASTER THAN A SPEEDING BULLET

Sprint cars are becoming more popular, and judging from photos like this, R/Cers put a lot of work into them. Todd Walsh of Purchase, NY, modified his RC10 with an Ascot Challenger Sprint Car Kit. Wheel-spinning horsepower comes from a B&R motor (which moves a set of MRC rear tires), and a Tekin ESC and Futaba radio guarantee perfect control. Todd, you earned a free subscription for this great Silver Bullet sprinter!



STEPHENVILLE SIX-SHOOTER

Lee Baker of Stephenville, TX, created this wild, twin-motor buggy. The original car was a Radio Shack Golden Arrow, and with the addition of a second transmission and set of driving wheels, what you see is unclassifiable! Other mods include an elongated wing (presumably to increase rear downforce) and six coats of metallic, ruby-red finish. Lee must get some weird looks when he visits the track with this car!

FLAMING YELLOW WHAT?!

This Clod—affectionately known as “Flaming Yellow Zonker”—belongs to Keith Widom of Canyon Country, CA. With rear lights that light up when the throttle is released and dirt-flinging B&R motors to propel it to warp speed, this truck lives up to its wild-and-crazy name!



SHINING PROSPECT

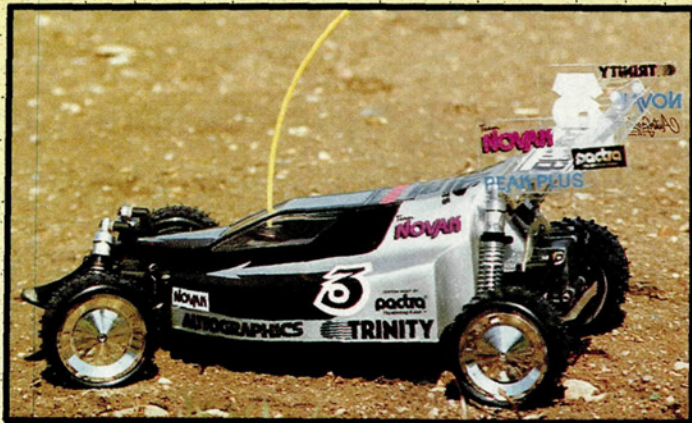
With all its shine and glint, it's easy for David Cieske (of Gilroy, CA) to see his JR-X2! The multicolored paint job and sparkling chrome TQ wheels might make you think that this car is all show and no go, but it's the scourge of the track in stock class! Its first time out—David's first race!—it TQ'd and won the Main! David had tricked it out with Robinson gears, a Tekin 600 ESC and a Novak micro receiver. Associated TQ wheels and tires stick it to the track; a Twister Ultra Stock provides the ponies. With a first race like that, we expect to see David's name on a lot of winners' charts!

CHEAP WORKERS

Steve Weller of Perkiomenville, PA, is the proud owner/driver of this RC10. He set it up for dirt-oval racing and painted its Custom Works Open Comp Camaro body like a 7-Up can. All over the body are little “dot guys” washing windows, waving flags, hanging on for dear life, etc.! Steve couldn't have won the track championship (with a perfect score, no less!) with just a good-looking car body: he installed a Novak T-1X speed controller, a KO Propo EX-5 radio and other goodies. Perhaps the “dot guys” can help him set up the car with an on-the-track analysis!

KING OF THE JUNGLE

Ralph Thornton of London, Ontario Canada, owns this hot-looking Schumacher Cat XL. To make the original design more competitive and to make the car run fast and true, Ralph added Trinity front and rear ball diffs, a Trinity Pure Gold motor and Wasp Orange belts. When Ralph throws in a 7-cell pack and gets ready to go, you can be sure that he's king of the jungle!



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LETTERS (Continued from page 9)

TOTAL CONTROL FOR THE PHYSICALLY CHALLENGED

I'd like to get into R/C car racing, but I'm handicapped and can't control the radio—whether it's a stick or a trigger type—because I only have the use of one hand. I tried to operate my friend's radio, but I just can't work the controls simultaneously. I've read a lot of magazines to try to figure out some way to rig a control stick (like the joystick) onto my electric wheelchair. Does any manufacturer sell such a radio, or plan to make one? It would be very helpful for me and the many other handicapped people who would like to get into this sport. I find your magazine enjoyable and informative.

GARY BRUNAZZI
McKeesport, PA

Gary, it seems easiest to use a 4-channel radio, in which one stick controls two servos, so you could have steering and throttle on a single stick. The only problem is that most 4-channel radios are on 72MHz, while cars are only on 27 and 75MHz, but you can have the manufacturer re-tune the radio for a small fee.

AS

Gary, Alex's solution is a good one, but, as a musician, I offer this alternative. A volume foot pedal used for electric guitars is nothing more than a linear gear that turns a potentiometer. The pot might not have the right electrical value for R/C, but it can be changed. Then you can run the wires from the pedal to the transmitter (with a long lead) and control your car with your foot! I'll look for an old pedal so that I can try to build one myself. I'll be talking to you soon.

CC

WOULD YOU BELIEVE INCH-GEARS?

I'd like to make a suggestion to the industry about gear ratios. In three weeks, I've entered the stock class in five competitive events. I found gearing very critical and it was addressed unsatisfactorily by most people I talked to, including so-called experts. As a result, I thought back to my younger days, when I raced bicycles as an amateur. The system used then, and now, was related in terms known as "inch-gears."

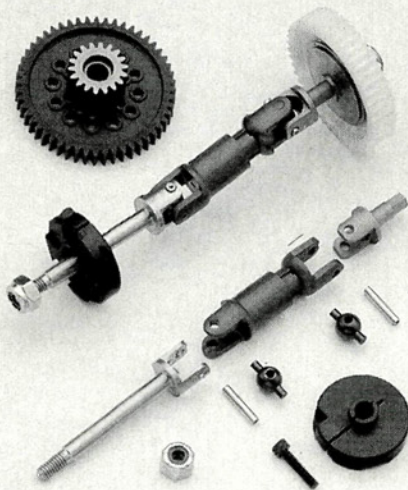
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NEW FROM THORP

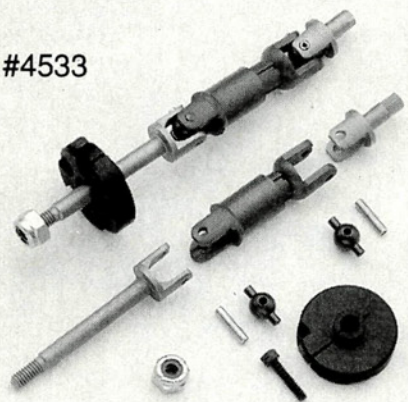
Thorp Manufacturing's introduces three new kits to help you get even more performance from your Blackfoot and RC-10. Check 'em out!

For your Blackfoot:

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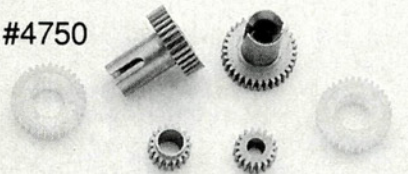


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Catalog \$2.00

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LETTERS

(Continued from page 18)

An inch-gear is the distance traveled on the bike per revolution of the crankset, or pedals. A recent article in your magazine stated that, in 1/12-scale racing, 1/8 inch of tire wear could affect as many as two teeth on the pinion gear. I decided to research this, and I found the "inch-gear" system to be the best method of calculating.

To find the distance traveled in one tire revolution, multiply the tire's diameter by π (3.1416). (This is the formula for measuring the circumference of any circle.) Then divide that number by the final gear ratio to the axle. (Transmission cars require some additional calculations.) The result relates distance of travel to armature revolutions, or, in my old bicycle terms, inch-gears. Putting all this back into racing terms, I figured out the inch-gears on my RC12L using old and new tires and a consistent ratio of 3.90 (78/20-48P). Using a new tire cut to 1.75 inches in diameter and one worn to 1.5 inches, the figures were startling:

1.5-inch wheel = 4.71-inch cir.-3.90
ratio = 1.21 inch-gear

1.75-inch wheel = 5.50-inch cir.-3.90
ratio = 1.41 inch-gear

This actually relates to three teeth on a pinion at 48 pitch. Only individual racing conditions will determine which is actually the right way to go—up or down.

All this relates to winning a race. When I had to change rear tires after losing a chunk on the first heat, I dropped only one tooth on my pinion gear. Although I finished the race, I definitely lost punch over the course. According to the inch-gear system, I should have dropped *four* teeth to stay consistent.

I write to you as in an attempt to promote this system. If tire manufacturers would publish their "new" diameter specs consistently, and if track owners would relate their conditions in terms of class and inch-gear most frequently used, newcomers would be able to break into the sport more quickly. I'm sure that skilled racers already use this system, but, lacking consistent terminology, it gets lost in the pits.

I'm curious to know what your readers

think of adopting this system as common terminology. Believe me, going to a track and knowing that someone in stock class with a similar car is running a 1.34 inch-gear is a lot more significant than knowing he's running a 4.11 ratio to the axle.

TOM DICKINSON
Annapolis, MD

Tom, what you've suggested is not uncharted ground. This concept of combining gear ratio and tire size has been used by invitational class drivers for some time. The new cap tires will take some of the guesswork out of racing, because they wear considerably less, but there's still a need for racers, both on- and off-road, to understand better how tire size affects run time. The system you suggest is a good one, and if our readers are serious about how fast they want to go, they'll take a close second look. Thanks for the input.

TEENAGE MUTANT OFF-ROAD TRUCKS

I'm rather disappointed by the way monster-truck racing has developed. In all other classes of racing, R/C cars are raced in the same way as their full-scale counterparts. A real monster-truck track is like a dirt drag strip with an immense obstacle in the middle—some old cars, or a deep pool of mud. Why, then, are monster trucks run on off-road car tracks?

Perhaps it's because most of the vehicles now raced as monster trucks are no more than popular off-road cars with big wheels, a truck body and some minor gearing and suspension changes! These trucks lack the power and rugged build of true monster trucks.

In "Clash of the Titans II," you declared the Clod Buster to be the best monster truck (and I agree), but to enter the Clod Buster in most monster truck races would be little more than a good joke. I think that ROAR should create new rules specifically for monster trucks that stress such strong points as climbing ability, or the ability to tackle large obstacles—ones that would leave most conversions stranded!

I'd like to hear your opinion.

BRETT JONES
Bellevue, WA

Monster trucks have come a long way in a short time, and their popularity was rather unexpected. I think that ROAR was caught off guard by the explosion in truck sales. Running converted buggies on the off-road circuit is a completely different form of R/C racing, and it has a full-scale counterpart. I guess you're not aware of Mickey Thompson Stadium racing, in which off-road trucks run on an off-road course replete with jumps and moguls. "Converted buggy" trucks more closely resemble these full-scale racers. Monster Crushing events and sled-pulling are very much alive; they're just different from off-road truck racing. As for racing emulating the full-scale "drag-strip" style, I think the NR/CTPA is working on a set of rules that will suit your needs.

CC

NO REPLY

I've had a problem with an article in your December '89 magazine. It was about the International Electric Drag Association. I'd like to receive a set of their rules. I've written them two letters, but have received no reply. I can't understand why they don't answer my letters. I'd appreciate any help that you can give me.

PAUL D. JONES
Indianapolis, IN

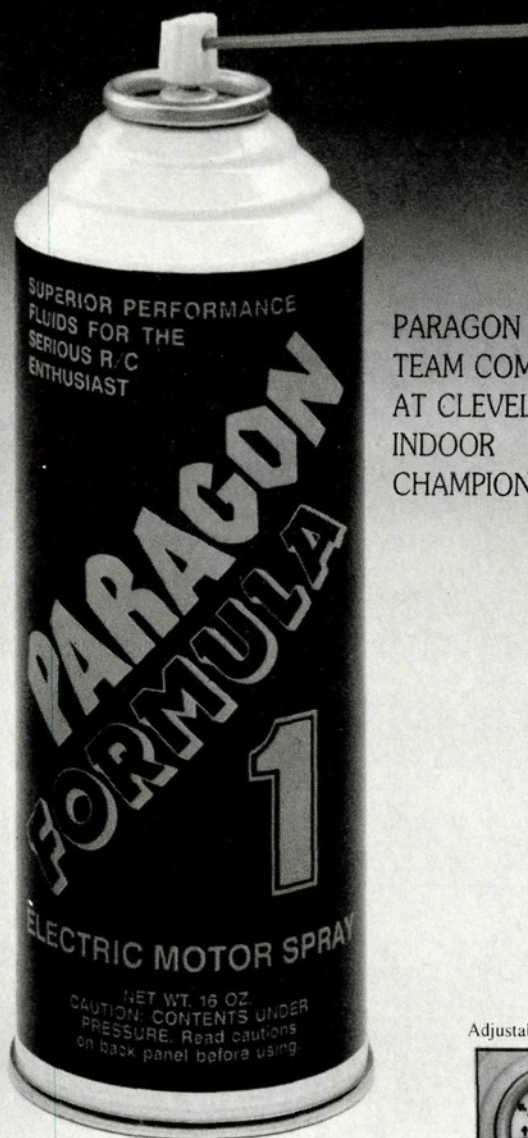
Paul, the IEDA is still in its infancy and it's understaffed, give it a chance. I don't know to which of its two addresses you sent your letters, but here's the one I've had success with: IEDA, 13311 Beach Ave., Marina Del Rey, CA 90292.

CC

WHERE TO WRITE TO US

If you're writing to us (and we'd love to hear from you), please be sure to address your letters to "Letters," *Radio Control Car Action*, 251 Danbury Road, Wilton, CT 06897. Only subscription orders and inquiries are handled by our Customer Service Department in Mount Morris, IL; other mail addressed there must be forwarded to us in Connecticut, and this leads to long delays.

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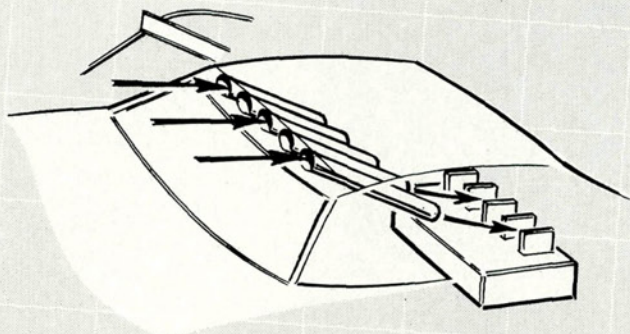
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PIT TIPS

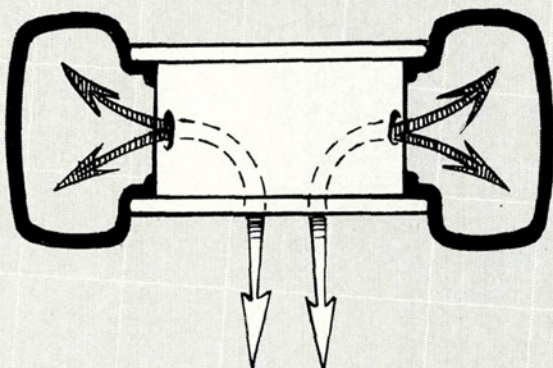
by JIM NEWMAN



SPEED-CONTROLLER DUCTING

Here's yet another method of ducting air to heat sinks! Cut large drinking straws at an angle, insert them in holes above the windshield, and secure them with glue. To blast air onto the Mosfets, they should be angled downward.

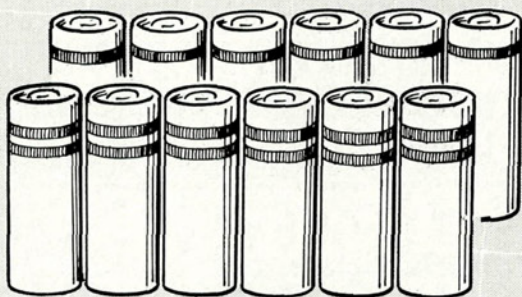
Allan Thomas, Manteca, CA



WHEEL-HUB VENTS

If your car's rear tires remain flat after the impact of a jump, drill a pair of $\frac{3}{32}$ -inch holes in each hub to allow the air to vent back in.

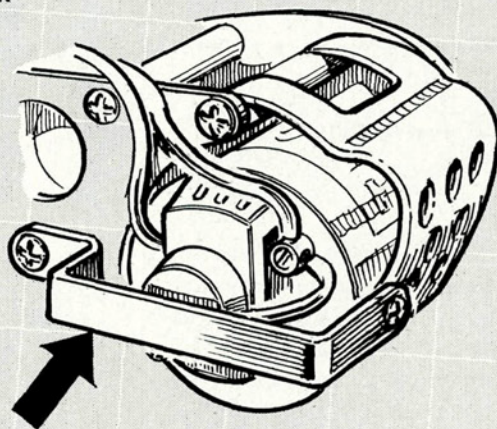
David Konyk, Grimsby, Ontario, Canada



BATTERY CODING

Tony owns a Radio Shack charger that takes 6 AA cells at once, but he mixes up his charged and discharged cells. His solution: using colored tape or paint, code the cells in batches of six. If you have only one color, use a series of stripes as I show here. Pack One has one stripe, Pack Two has two stripes, etc.

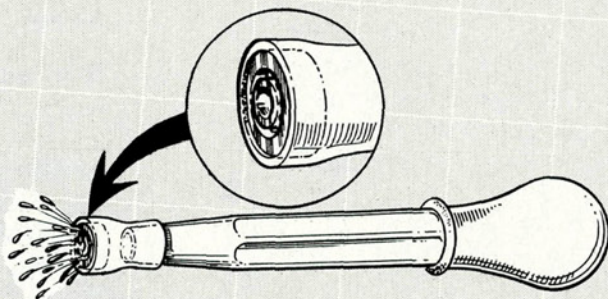
Tony Quarnaccio, Rockledge, FL



BRUSH-HOLDER GUARD

After the brush holder of his Optima took a solid hit, which resulted in a "melt-down," this contributor noticed that the regular motor guard didn't protect that vital component. He used a strip of steel ($\frac{1}{8} \times \frac{1}{4}$ by approximately 3 inches long) to make this extension.

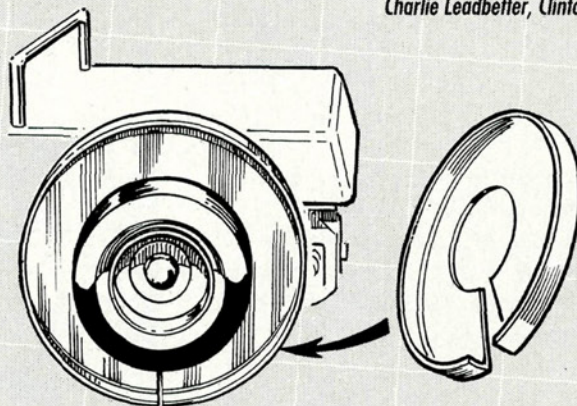
Jim Stone, Pinckney, MI



HIGH-PRESSURE BEARING CLEANER

Push a piece of surgical rubber tube over the end of a turkey baster, fill the baster with mineral spirits, and force a bearing into the tube. Squeeze the bulb and blast out the dirt!

Charlie Leadbetter, Clinton, MD

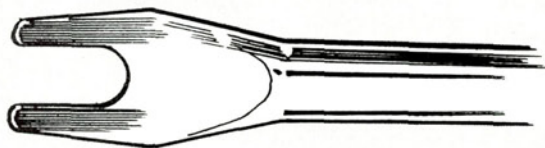


MOTOR SPLASH GUARD

If you hose down your wheels and tires, this simple splash guard will help to keep the electrics dry. Cut a large hole in the center of a butter-tub lid, split it as shown and slip it over the suspension.

John Mah, Agincourt, Ontario, Canada

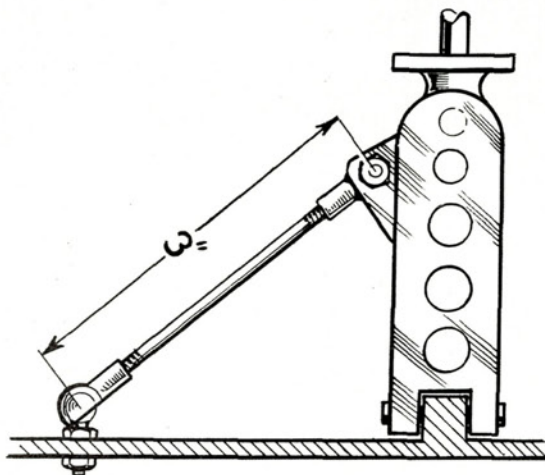
PIT TIPS



BALL-LINK REMOVER

Saw and file a slot of a suitable size in the blade of an old, large screwdriver, clean out the burrs, and you'll have an effective tool for popping off ball links without splitting the sockets (as usually happens when you try to twist them off).

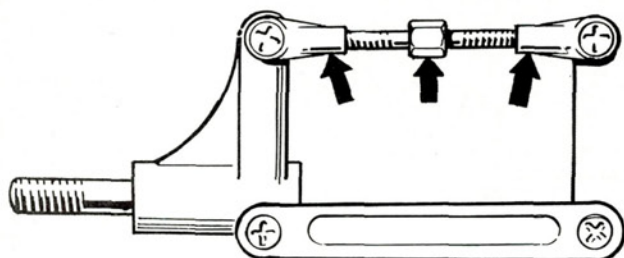
Chris Scranton, W. Salem, IL



HOTSHOT RADIUS RODS

Tired of your A-frames needing frequent replacement? These rods distribute fore-and-aft suspension loads over a much wider base and relieve the A-frame pivots of a lot of stress caused by side-thrust. These threaded rods (same as those used on the steering) have a ball joint on each end, and they're attached to the steering stop at the front and to the battery box at the rear. Remember to trim the body shell to allow movement.

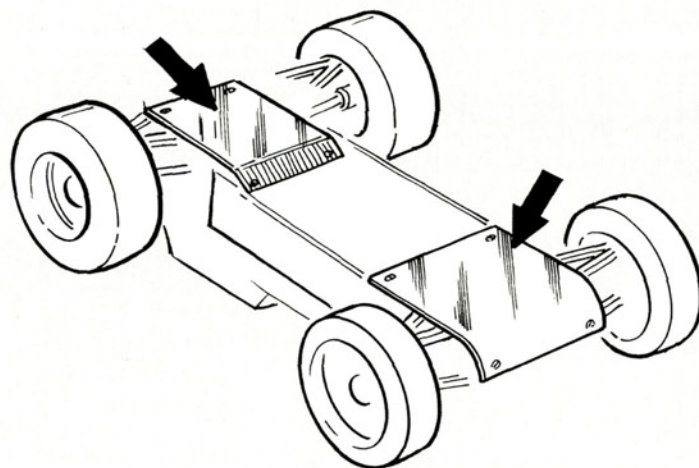
Martin Queckenstedt, Dunneville, Ontario, Canada



THUNDERSHOT CAMBER ADJUSTMENT

If the inboard edges of your vehicle's rear tires suffer severe wear, replace the fixed-length, plastic top links with Bolink 4-40 Adjust-A-Links and Du-Bro 4-40 Swivel Ball Links (all shown arrowed). This will allow you to tune the rear-suspension angles to your satisfaction.

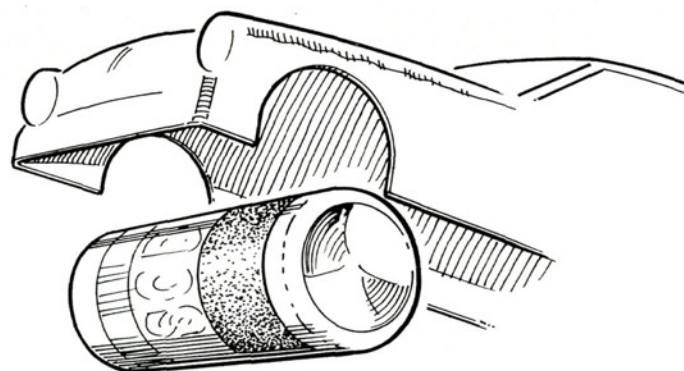
Jamond Haug, Elkhorn, NE



GRASSHOPPER SKID PLATES

If you drive a rough track, you may have noticed severe damage to the bottoms of your A-frames and gearbox case. To protect these components, use 1/32-inch aluminum from the K & S rack of your hobby store. Cut and bend them to shape, then screw them to the underside of your car, as shown in this simplified sketch.

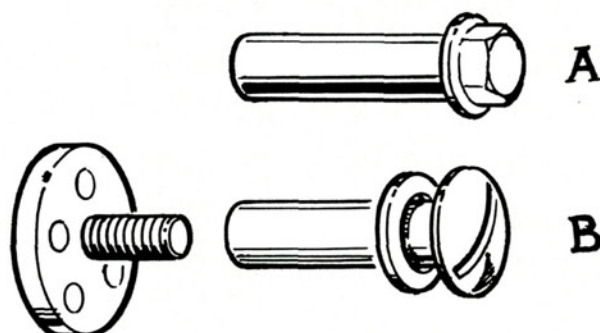
Jason Pape, Lancaster, CA



WHEEL-WELL SHAPER

You don't have to trim out wheel wells with clippers and a knife. Wrap sandpaper around a soda can; it's the right diameter, and it will give you a beautiful finish.

Brian Hill, Andover, MA



BLACKFOOT-CONVERSION AXLE BOLTS

The JG conversion kit (which allows Big Bear tires to be used on a Blackfoot) has plastic axle bolts. One-inch, aluminum, loose-leaf-binder posts (available at office-supply stores) make an admirable replacement. Saw a screwdriver slot in the tops, and add a washer to take up the slack. (A is the original; B is the office-supply special.)

Gordon Drauden, Braceville, IL

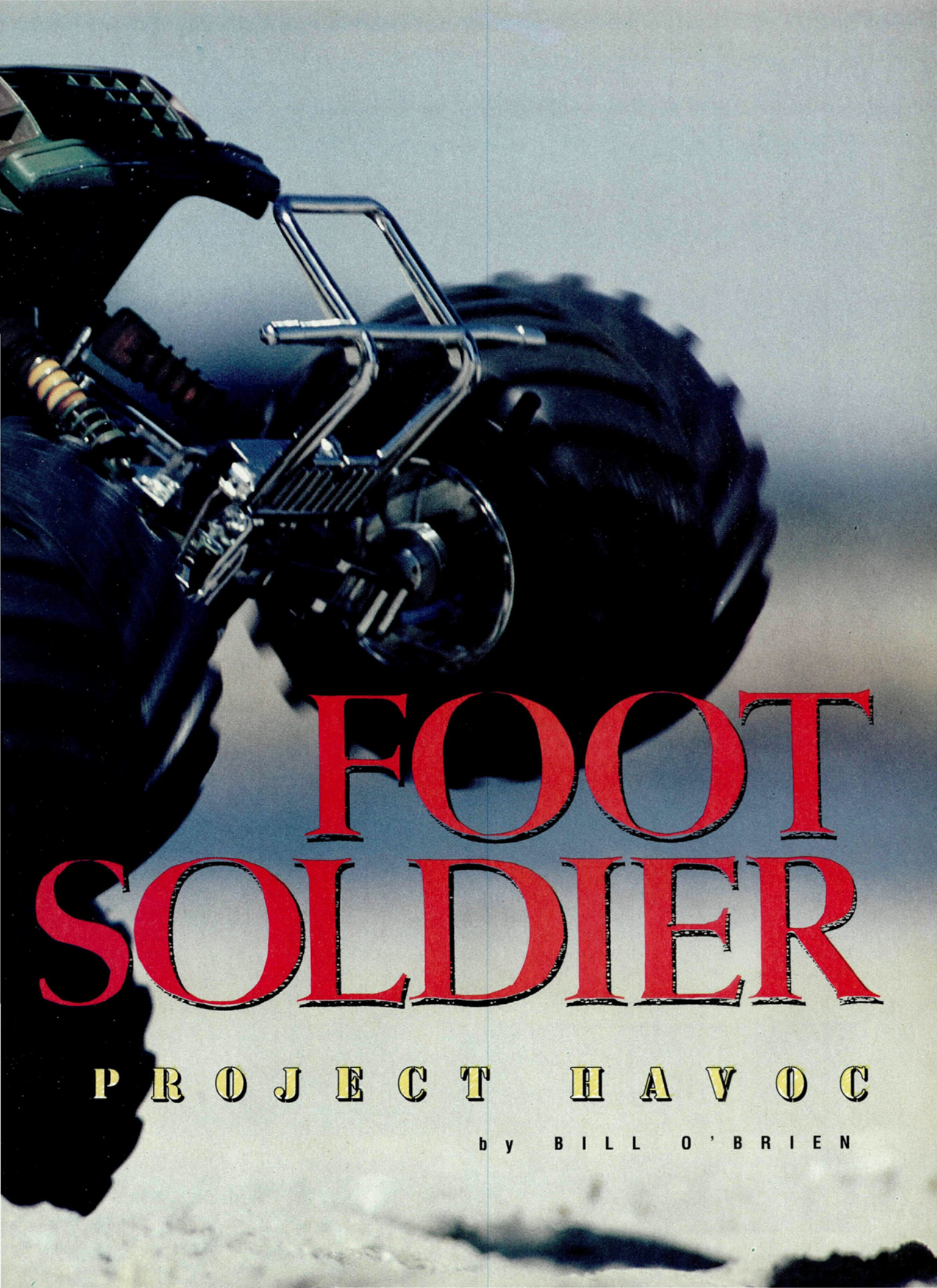
Radio Control Car Action will give a free one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Pit Tips." Send rough sketch to Jim Newman, c/o Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material.



PHOTOS BY STEVE POND

Monster-truck owners are more than willing to roll over some of the street cars they come up against in the name of innocent fun. Truck conversions make that more difficult as cars gain height and width and take on near-monster-truck identities. So, if you can't run over them any more, why not just blow them out of the way?





FOOT SOLDIER

P R O J E C T H A V O C

b y B I L L O ' B R I E N

FOOT SOLDIER



TANKS FOR THE MEMORIES

I've had my Blackfoot for a long time, and, in mostly stock form, it's seen action as a monster truck, a racing truck and a tail-dipping stunt truck. Of course, if you're a regular reader of *R/C Car Action*, you also know it even spent a mad period as a 4WD x 2WS 20-plus-inch-long hybrid truck called the Behemoth. My problem is that I'm never happy with anything I do for very long.

Somewhere in the middle of a 1/16-scale tank conversion (see what I

mean?), I sat back and had a long, cold thought. With everyone converting tanks into trucks what's happening to our home defense system? I mean, I live in a moderately stable urban environment, but it never hurts to have some firepower, just in case. Soon all the tanks would be gone!

That's when the A-B Normal side of my brain kicked in. I had a Tamiya* plastic mobile anti-aircraft gun sitting in a corner of the room waiting to be assembled. It had a 35mm gun mounted on what

looked like an Abrams M1 tank base. The gun was fine, but, overall, the model was too small to be intimidating on its own. In another corner of my workroom (this four-sided room seems to have no end to the number of corners—somewhat like Dr. Who's Tardis) sat the Behemoth. "Hmmm."

The gun mounted in a swivel lock on the tank's deck, in place of what would normally have been the turret, and it was a flat mounting arrangement. The bed of the Behemoth was also flat. ("Hmmm" number 2.)

The anti-aircraft gun was lost in all that space on the extra-long, stretched bed of the Behemoth. When I elongated the original Blackfoot Ford body, I had cut it into three sections and stuffed balsa and brass between them. It shouldn't be that difficult to "unstretch" the body.

Above: The Foot Soldier's super-wide track is made by using Aristo-Craft Mammoth tires on Custom Chrome's Clod Buster wheels. This is one monster that won't be easily knocked onto its back.

"My problem is that I'm never happy with anything I do for very long."

("Hmmm" number 3.)

I don't know about you, but when I get to the third "hmmm," I'm hooked on a project. (I'm only on my second one for a Rock-Buster-to-Monster-Jeep conversion). What clicked in my mind was the picture of a perfect R/C Urban Assault Vehicle that was quick, nimble and utterly offensive—everything that Tamiya's Fast Attack Vehicle wasn't.

SURGICAL STRIKE

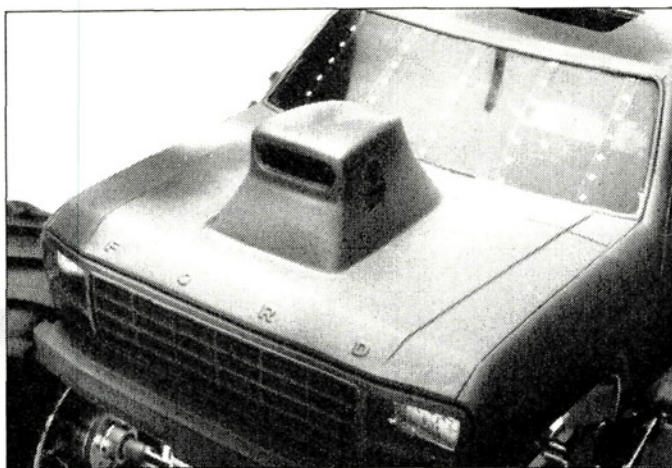
It took me about a day and a half to strip off the Bondo, CA, balsa and brass. It took another day to sand and rejoin the original sections so the Ford body was back to stock length. Yet another day went on finding all the misplaced Blackfoot parts that I had "put in a safe place"

after the Behemoth conversion. (Even though a year had gone by, I found everything but the stock speed-controller mounting plate, but I had a spare. It was in a corner somewhere.) When I had finished, I had a stock—if somewhat battered-looking—Blackfoot.

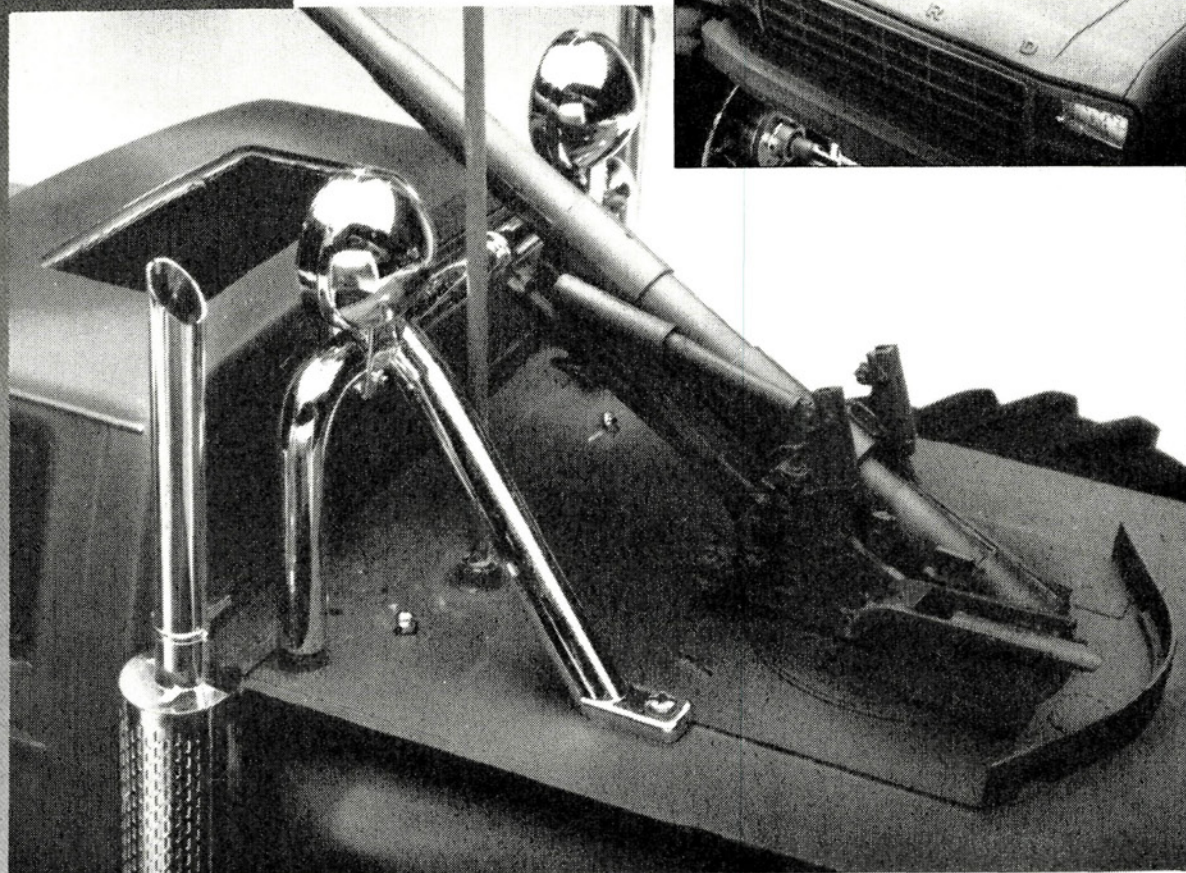
I laid out the parts from the mobile gun and began to alter what I needed for the conversion. The tank's deck was the first to go. With a dab of a sponge against my perspiring brow and some inspired cutting with an X-Acto saw, I

neatly removed the section of the deck containing the swivel-mount base. I used it for a template on the bed of the Ford body, and I drew the appropriate lines and circles that would indicate the material I'd have to remove to fit the mount.

I made the first incision in the bed with a 1/4-inch drill bit, followed by some deft wrist action with a coping saw (and some people think I can't cope!). After about an hour of dicing, slicing and sanding, the swivel mount fit in as if it had been made for that opening. Two hours later,

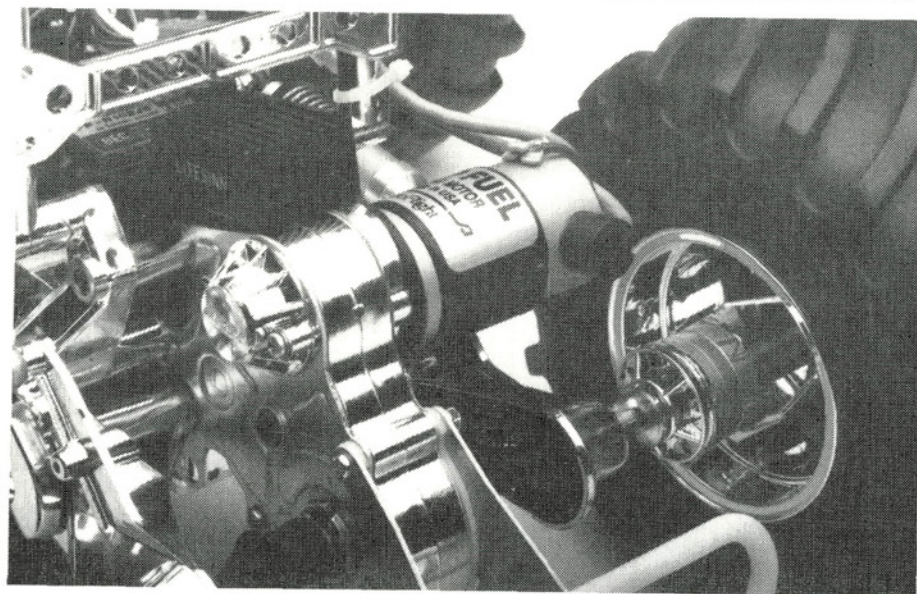
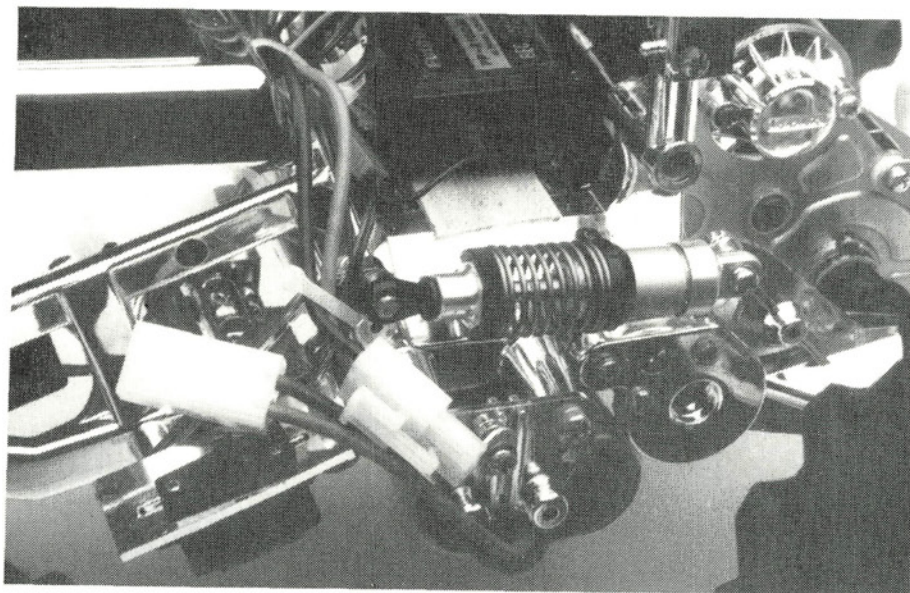
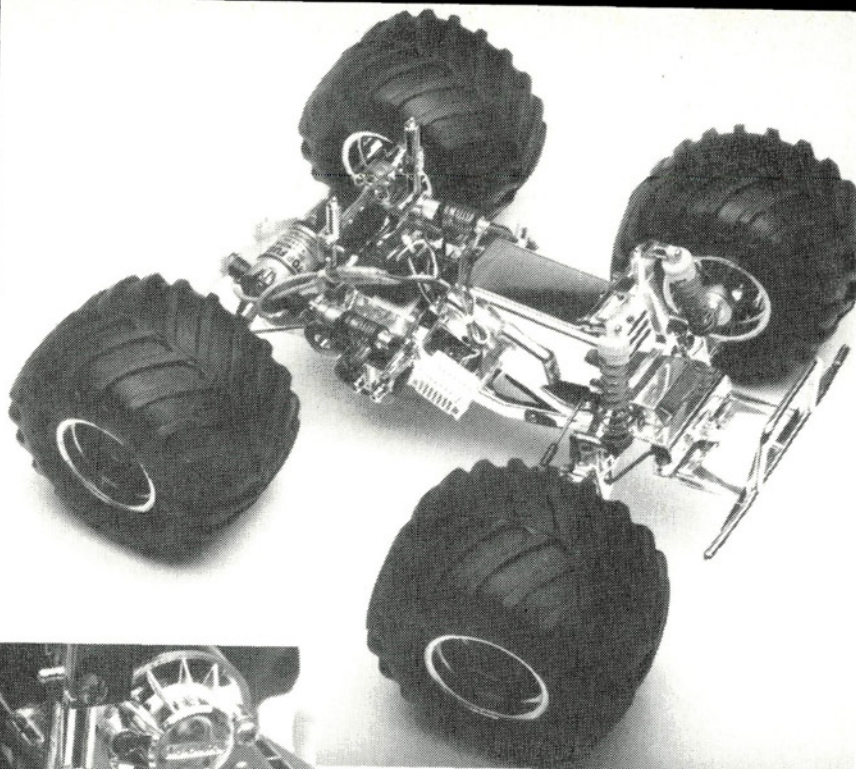


Left: The chrome stacks are from an ERTL 1/16-scale Peterbilt tractor kit, and the 35mm anti-aircraft cannon is from a Tamiya kit. Above: The hood scoop was made from a cut-down Parma Pro-Stock scoop.



FOOT SOLDIER

Right: From beginning to end, the sparkle is supplied by Custom Chrome. This monster almost looks as if it belongs on a formal dining table!



I finished assembling the gun itself (there's a lot of detail) and trial-mounted it. That was the look I wanted!...well, almost.

My Blackfoot is about three years old, and it was obvious that, even with a coat of paint, it would still look like a Blackfoot, and a slightly tired one at that. Not good enough, I'm afraid. Now it was time for the most devastating "Hmmm" of all—the one that comes after I start a project.

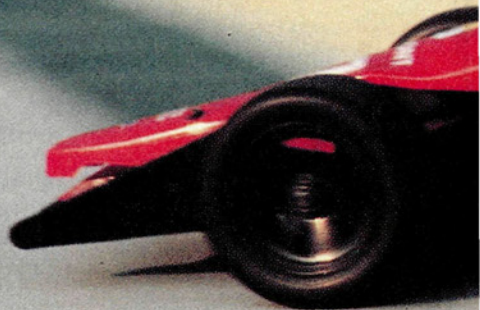
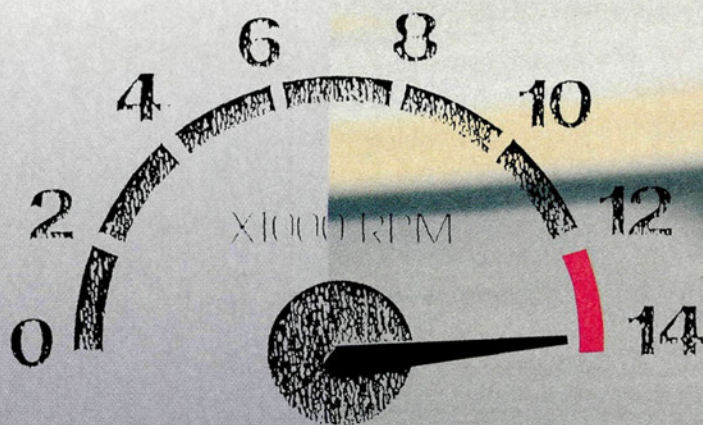
FANCY FOOTWORK

I thought out the concept to its natural conclusion, went to the hobby shop and attacked the paint shelves. My Foot needed to be camouflaged! It needed to blend into the scenery, to be able to stick and move, stick and move. That's the essence of a UAV.

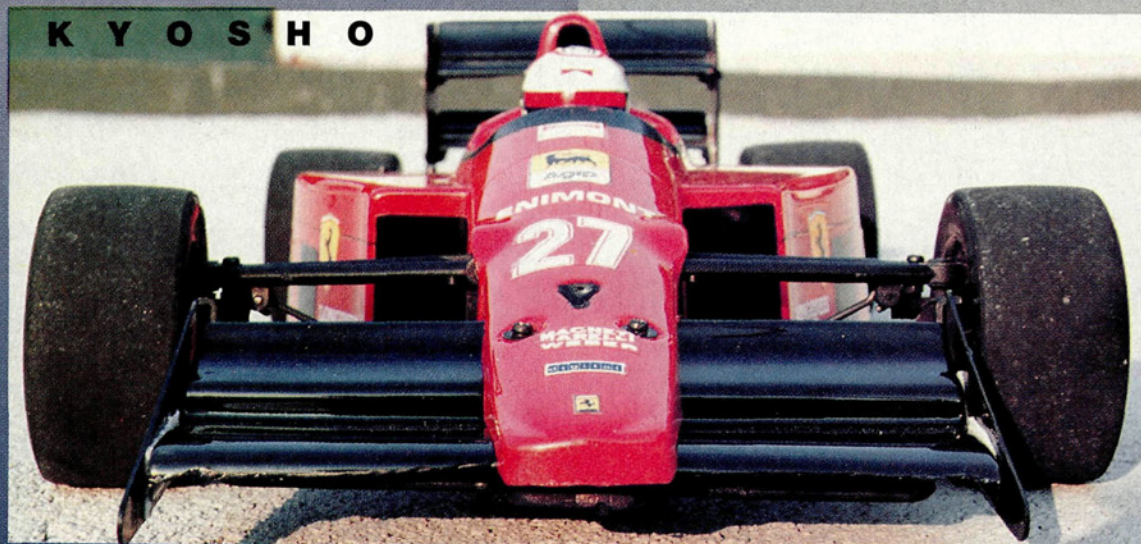
I'd never done camouflage before, but my hands had a mind of their own. Down came the Pactra* Model Master paints. Flat Black was an easy choice. The label color for Flat Rust looked as if it should work.

(Continued on page 78)

Above Left: Kyosho Platinum shocks are used in the rear, while Tamiya yellows are fitted up front. Left: A Thorp diff handles the Astro Top Fuel motor.



F O R M U L A O N E **FERRARI**

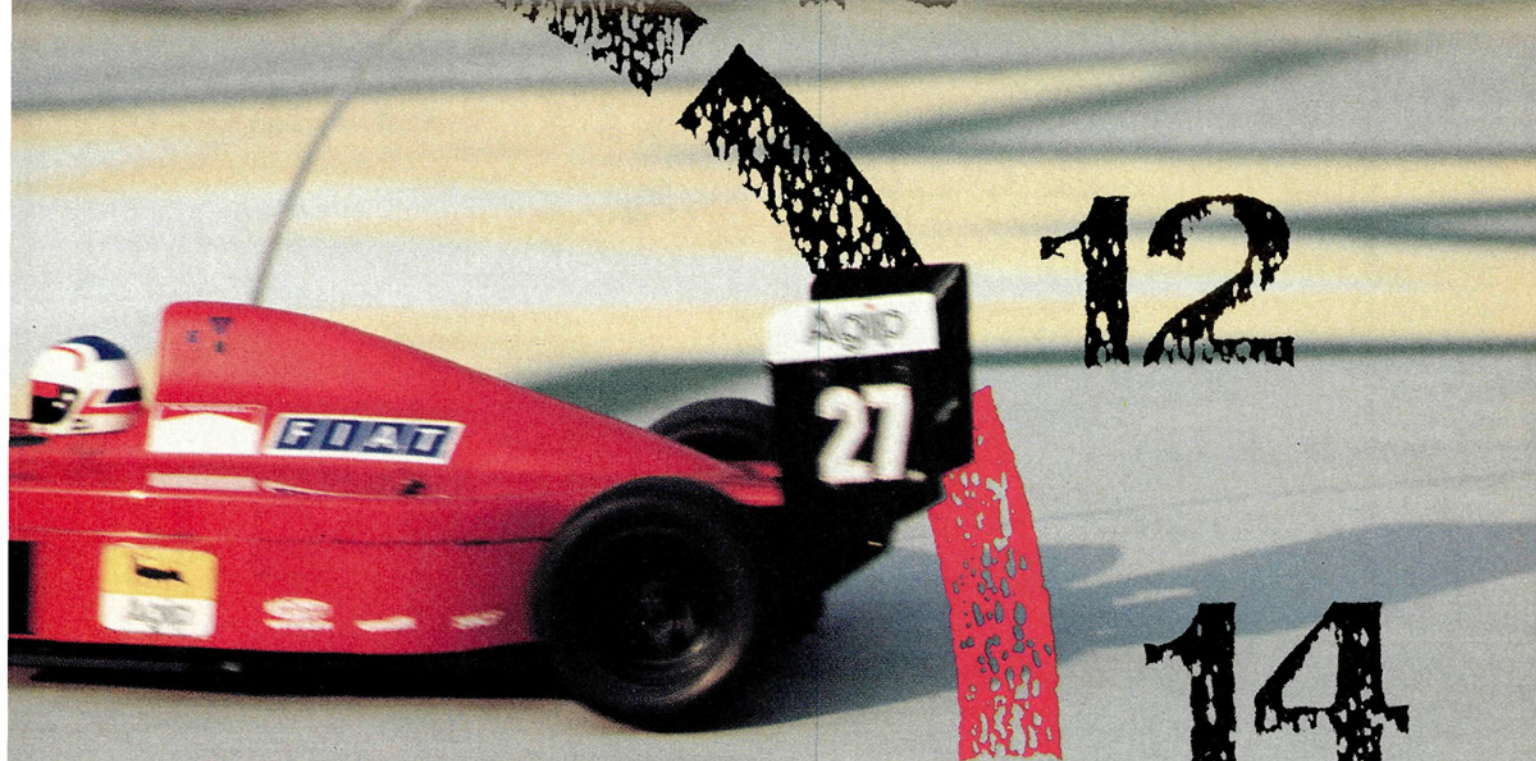


PHOTOS BY STEVE POND

RED LINE TIME

by ALEX STROUTHOPOULOS

The term "Formula 1" evokes images of multimillion-dollar cars, drivers like Senna, Prost and Mansell, and manufacturers like McLaren, Ferrari and Williams. To become one of the elite drivers, it



Martin Garcia helps keep the Ferrari fine-tuned for the photo shoot.

it takes years of hard work and the ability to control 1,000hp engines in 1,200-pound cars that race at tire-blistering speeds.

Most of us will never achieve Formula 1 heights, but we can now get one small step closer with a new kit from Kyosho*. The Ferrari F189 is a 1/10-scale replica of Ferrari's Grand Prix racing car, and its unique features make it deserving of an in-depth look.



KYOSHO FERRARI F189

Type Formula 1
Scale 1/10
Sug. Retail Price \$199.95

DIMENSIONS:

Overall Length 16.25 inches
Width 7.5 inches
Height 3.5 inches
Wheelbase 10 inches
Front Track 6.5 inches
Rear Track 5.75 inches

WEIGHT:

Gross (with battery) 44 ounces

BODY:

Type Formula 1
Material Polycarbonate

CHASSIS:

Type Upper and lower plate
Material Plastic

DRIVE TRAIN:

Primary Pinion/spur
Transmission Gear
Differential Bevel gear
Bushings Plastic

SUSPENSION:

Front: Type Upper and lower wishbones
Dampening Pushrod-actuated inboard dampener/spring units
Rear: Type Upper and lower wishbones
Dampening Upper-track control rod; pushrod-actuated inboard dampener/spring units

WHEELS:

Front: Type One-piece plastic
Dimensions (DxW) 1.375x .75 inches
Rear: Type One-piece plastic
Dimensions (DxW) 1.375x 1.25 inches

TIRES:

Front/Rear Semi-pneumatic rubber

ELECTRICS:

Motor Mega Outlaw Stock
Battery 6-cell stick*
Speed Controller Three-step mechanical

*not included

OPTIONS AS TESTED:

Kyosho Pulsar 2000 2-channel radio; Futaba MC-9 electronic speed controller; 6-cell stick pack.

COMMENTS:

One of the most scale-looking R/C cars—but not at the cost of performance; the F189 is a delicate balance of both. The three-step speed controller is Kyosho's heavy-duty version, but when running a 22-turn motor at a 4:1 ratio, things get a little hot.

FERRARI



THE KIT

Inside the box, you'll find a heavy-duty speed controller, a Mega Motor, metal dogbones and axles, a well-detailed body and all the other parts. As usual, the Kyosho instruction book is clear and concise.

ASSEMBLY

If you feel an incredible urge to race as you walk out of the hobby shop, wait to do it on the track. Don't rush through the assembly, because you won't get any extra points or a trophy for finishing quickly. Read the instruction book thoroughly before starting, because if you spend a few minutes

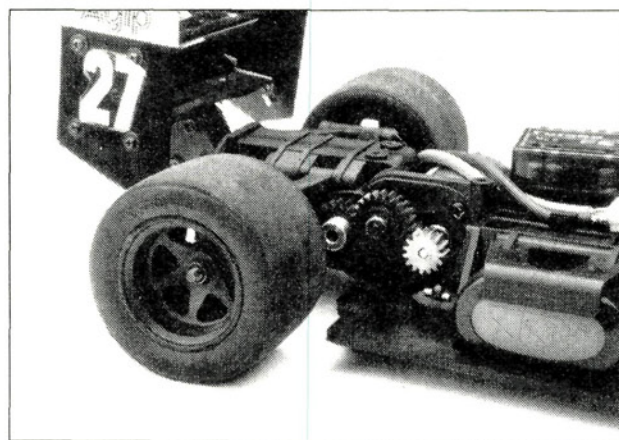
reading now, you'll avoid spending hours making corrections later.

Start with the front and rear shock absorbers, which are small, metal friction units that use two small friction sponges for dampening. Kyosho says that you should hold the piston with a pair of pliers when you screw the shock end onto it, but put a piece of paper around it first, to protect it from being scratched. I noticed that the piston was notched to take a Phillips-head screwdriver, so I inserted a small screwdriver into the shock shaft and tight-

ened the end that way.

Next, attach the shocks to small mounts, and then attach tension rods to the mounts. The F189's suspension is a replica of the one on the full-scale Ferrari. It uses inboard shocks controlled by a tension rod, or pushrod, which is attached to the front and rear knuckles. This system allows a greater arm travel from a shorter piston travel.

When bolting the front knuckle-arm assembly to the front A-arms, I had a few problems, but they were my fault. The car uses A-arms of unequal lengths, and it was difficult to figure out which went where, because the instructions aren't clear. After a few tries, I found that the designers had given the car about 20 degrees of caster, but they did it by moving the upper A-arm pivot point about 1 centimeter back from the lower one. This has the same effect as tilting the kingpins of a pan car backward, but it looks

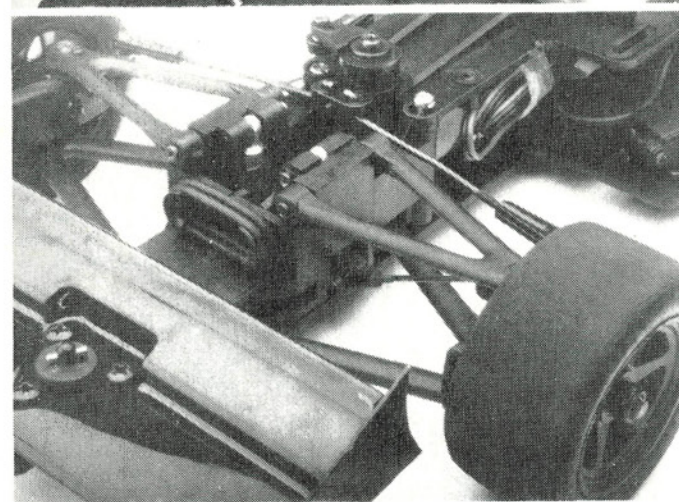
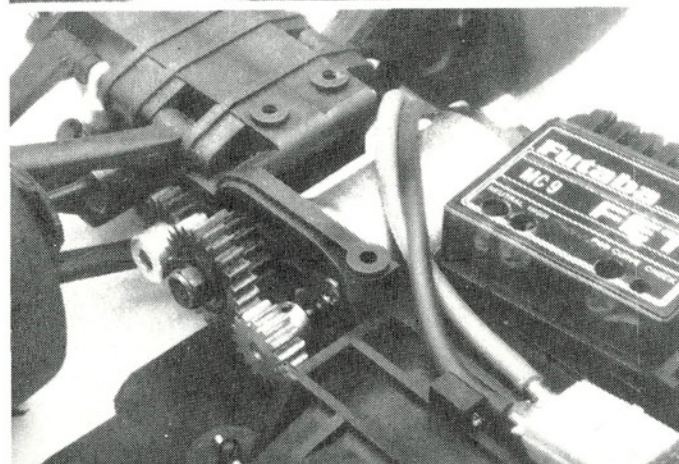
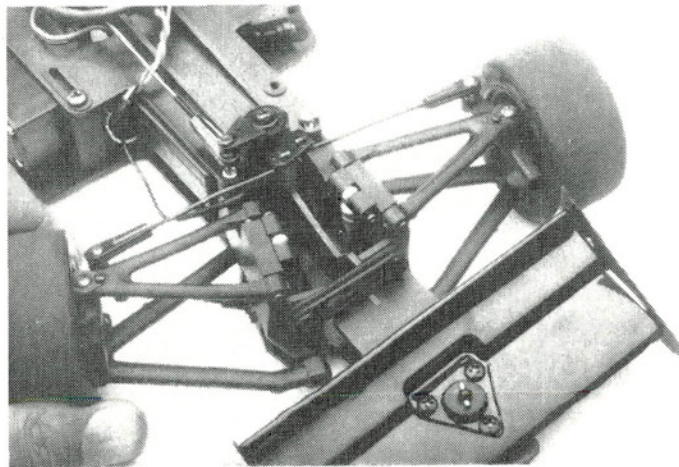


To maintain its body's scale lines, the Ferrari has a gear reduction instead of a direct drive. Note the scale wheels and semipneumatic tires.

FERRARI

different.

When I bolted the front-end assembly to the chassis, I noticed that the chassis flexed a lot—so much that I thought it was defective! I later discov-



■ Top: The fragile-looking front end is protected by a crash-back system resembling the one used on Schumacher off-road cars. ■ Middle: The motor is mounted on the chassis center line, just in front of the transmission. Its tight fit allows only three ratios. ■ Bottom: Actuating rods connect the inboard-mounted shocks to the suspension.

ered that the car's rigid radio plate stops this chassis flexing when it's bolted on. Even with the upper plate installed, there's some flexibility, but it helps the chassis to absorb the impact of high-speed crashes without breaking.

The front A-arms looked vulnerable, but Kyosho has done its homework. The front suspension has a "crash-back" feature like those on the Schumacher off-road cars. By using two rubber O-rings for tension, the front A-arm assemblies can pivot on a rear pivot post. Their overall travel is only $\frac{3}{4}$ inch, but this is just enough to take the sting out of any crash. The O-rings pull the A-arms back to their original positions.

Gearbox assembly comes next. I thought that using a gear train instead of a solid axle with direct drive was a little strange, but it seems necessary to maintain the car's scale lines (a direct-drive system would have the spur gear sticking up through the body). Scale appearance is a priority with all the cars in Kyosho's new line, and a direct-drive setup would compromise this objective while increasing performance only slightly. With the supplied pinion, the final drive ratio is 4.2:1, and the car can hit some pretty impressive speeds, although the tranny gears cause a slight acceleration loss.

The instruction manual lists 13- to 15-tooth pinion gears as options, so you can experiment to find which works best for your motor or track. The supplied Mega Motor Outlaw Stock is a 22-turn double with 20 degrees of set timing. Compared with the standard 05/540 that comes with most cars, it gives great power.

Adding the electrical system is one of the most crucial steps in the assembly. With only limited space under the

"The car is a blast to run, and its scale body and suspension make it look just like the full-scale car..."

WALTER ADAMS

low-slung body, Kyosho has just managed to fit the radio system, but there's little room left for anything else.

To complete the assembly, add a 6-cell stick pack and a Kyosho Pulsar 2000 EX radio, which has all the required features for a car like the F-1: it's inexpensive and it fits your hand like a glove. Do you have to use this particular radio? Not really; because the radio and the car kit are made by Kyosho, their union is rather easy, but just about any 2-channel radio system will do.

The Ferrari's main color is red, so I spray-painted the inside of the polycarbonate body with some Coverite* Body Shop Red, and the front and rear wings with Body Shop Black. After adding decals, I was almost ready to hit the road, but first, I read the tuning tips at the end of the manual—just to make sure that I had adjusted everything properly.

PERFORMANCE

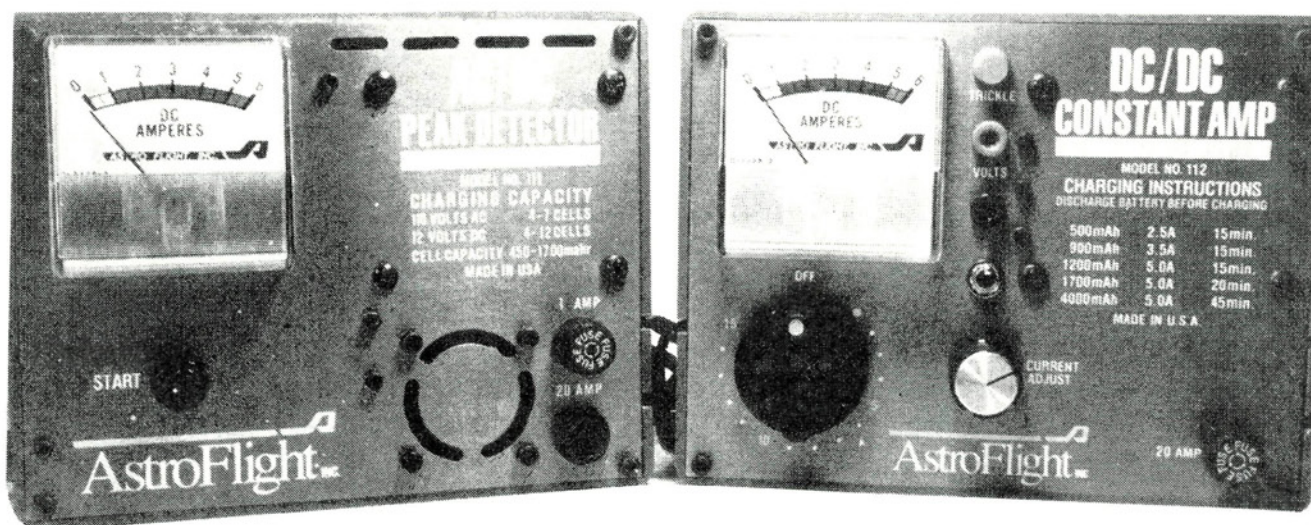
For its first trial, I took the car to a quiet street. I mashed the throttle and, with its semi-pneumatic rubber tires, the car did a series of spins off the start, just like competition on-road cars. For a clean start, the car needs just a little less than full throttle.

At full speed, a little "push" was noticeable—probably because of the slight sagging in the rear suspension and the rather stiff front springs. The car is a blast to run, however, and its scale body and suspension make it look just like the

(Continued on page 102)

DIRT DIGEST

by BILL O'BRIEN AND BOB KANE



Peak detector or timer?—a difficult choice. The peak model will keep your batteries in better shape longer, but if used properly, a timer model can yield similar results.

THE BIG PACK ATTACK!

IT'S A BEAUTIFUL DAY in the neighborhood; a lovely day in the neighborhood.... No, I'm not mutating into Mr. Rogers; it's just been a great month.

One of the few benefits of not having little dependents is that sometimes, even after sharing my meager income with Uncle Sam, there's enough left over to make it Christmas. This was one of those months. I walked into my hobby shop with a broad smile, and I walked out with a USA-1 and a Lazer-ZX. (I told you it was a great month.)

I put the USA-1 together that evening. Some time during the assembly, I realized that the chassis resembled an AT-AT (All Terrain-Attack Transport) from Return of the Jedi. (But that's for another column; some changes can be made to the truck. Be here next month.)

The Lazer-ZX looks great on paper, and at my local track, some racers have been doing well with the out-of-the-box car. I'll put it together during the next two

weeks (my Yokomo is still sitting in its box), and I'll let you know all the "dirt."

ALL CHARGED UP

Let's talk about batteries. They've become the most important thing in a racer's life, and their prices are totally outrageous. It's easy to pay as much for a 6-cell battery pack for your R/C car as for a 12V battery for your full-size one! (In fact, the R/C version might be more expensive.) Despite this, few people really know what goes on between their battery and their motors.

The problem is that few of those who sell batteries and chargers can really agree on what's happening. Manufacturers of rechargeables know one thing for certain: as far as they're concerned, we R/C folk do terrible things to our batteries. We kill them with fast chargers and high rates of discharge; and the 1,000 recharges that should be possible with most rechargeable batteries is a dream that none of us will ever see, given what we do to them.

Pretty bleak picture, huh? It's the truth. Every time you zap your pack with 3.6 amps or 4.5 amps, or a bazillion amps for 15 minutes (or even to "peak" them),

you're actually killing the cells. You're literally boiling the battery's internal components (feel the pack's heat?), breaking down its internal resistance and causing shorts, and your battery packs die.

You then spend more on a more expensive pack because the old pack failed and was obviously no good (not expensive enough?), and you start the whole thing all over again.

The situation is bad enough with timer chargers that can't sense the harm you do. If you use one, you set the timer for 15 or 20 minutes, according to its manufacturer's recommendation and, if you're smart, you keep feeling the pack to see if it's getting warm. If the pack starts to heat up, you pull it off the charger, even if the preset time hasn't elapsed.

Peak chargers are a little better. They sense the peak voltage of your pack, and they begin to discharge and then shut off automatically. It's brinksmanship, but it's an attempt to keep your pack as healthy as possible for as long as possible.

So what are we supposed to do? That depends. You should really have a half dozen packs (depending on your racing requirements) and charge them at their

trickle rate. Yes; you'll be charging each for 10 to 14 hours, and you should time it all so that the trickling ends on the morning of the day you'll be racing. (Now you know why fast charging is so attractive: it requires no brain activity; no planning.)

When you get to the track, you can turn loose your peak charger just before your race. Batteries develop what's called a "surface charge" that's over and above their rating. That's how six 1.2V cells can register 9.2 volts when you've finished charging them. That surface charge starts to drop the minute you disconnect the cells from the charger, and although an hour on a trickle charger will replace it, you can make some concessions to save time. A good peak charger will top off your pack in a few minutes and do minimal damage in the process.

Of course, none of this will appeal to some of you, because the R/C industry has become frenetic. We go for what's bigger and more expensive as competition replaces sound judgment. Perhaps we can justify it on certain levels, but maybe we shouldn't.

HONORABLE DISCHARGE

What happens when you've finished with a race and there are still some stray electrons running around inside your battery? You might do nothing and you wouldn't be wrong, but you've probably been told that you should discharge your batteries before starting to charge them again. That



No matter which type of battery you use, we guarantee that you aren't charging it as its manufacturer would like you to. Fast charging shortens your battery's life, but that's the price of impatience.

isn't wrong, either. (See why everybody's so confused?)

The trick is to discharge the pack as soon as possible at a rate that resembles the discharge rate that occurs while your vehicle is running (see Steve Pond's "Dumpster" article in the August '90 issue).

Generally, the discharge rate for off-road cars and trucks falls in the 10- to 20-amp range (closer to 10 amps, if you're running for 8 minutes; 20 amps for closer to 4 minutes). You'll also hear that you shouldn't discharge your batteries beyond a certain voltage level. Well, I'll make you a bet: if you have good cells (that's the fine print), and you discharge them until they're as dead as can be (where a voltmeter can barely get a pulse), in a day or two, they'll be back to their rated voltage. It's part of the miracle of the chemical process that makes your batteries work. But let the pack sit a while before you start to charge it again. This allows the cells to equalize.

BY THE WAY

Did you ever notice that battery tabs go in the same direction no matter whether they're at the top or the bottom of a cell? When I assemble a battery pack, I want the top and bottom tabs to go in opposite directions so that I can string the batteries out side by side. I've never seen a tabbed cell that was set up that way. Why is that? (Yes, I concede that tabs are next to useless if you're assembling a stick pack.)

WHAT'S NEXT?

Next month will be special because, as promised, I'll be tackling Kyosho's new monster truck—the USA-1 (and if you've ever tackled a monster truck, you know that it's not easy).

I haven't seen *R/C Car Action's* review of the truck yet, so I'm not certain how it will be received. (To be truthful, I asked the folks at my hobby shop to get me one as soon as the boat docked, and they did. That's why I love them.) There are, however, more than a few small areas that Kyosho seems to have ignored—at least, from my point of view—as far as durability and ease of use are concerned. My changes are easy to make and of no great consequence to the overall scheme of things, but they should be done. We'll do them.

Until then, let's keep the dirt on the tracks where it belongs, and remember: if you spend all your time and money on R/C, you won't have time to get into trouble with other things, and that's a good thing. See you.

R/C CAR

7314 N. Federal Blvd.
Westminster, CO 80030

CAR KITS

RC10 Std w/bearings	\$129
RC10 Std w/bearings	169
RC10 Graphite w/bearings	189
JRX2 Std w/bearings	169
JRXT Truck	219
Ultima Pro w/bearings	189
Optima Mid SE	229
Raider Std	89
Raider ARR or Turbo	109
Big Brute Truck	99
Big Boss Truck	119
Double Dare 4WD Truck	159
Blackfoot Truck	109
Mid Pumpkin Truck	109
King Cab Truck	189
Clod Buster 4WD Truck	269
RC10L Fiberglass	109
RC10L Graphite	149
RC12L Fiberglass	69
RC12L Graphite	129
Delta P-10 5 shock	219
Delta P-12 3 shock	129

Combo Package add \$100

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- 7.2 Volt SC Battery
- AC/DC Quick Charger

Package Options: Add

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FUT Jr w/148	35
FUT Jr w/132H	70
FUT Jr w/112B	75
7.2 Volt SCR	10
7.2 Volt SCE	20
Astro Flight 114	10
Protech 702	15
Protech 701	25
Protech 707	40
Protech 706	65

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SCOPING OUT

by JOHN RIST

TEKIN ESC 610

HAVE SOME BAD NEWS and some good news! The bad news? Tekin* no longer makes the wonderfully small, hot, ESC 600 speed controller. The good news? Tekin has replaced it with the spiffy ESC 610. Let's see whether this was a mistake.

The ESC 610 is a true racing speed controller (SC)—a forward-only-with-brake style. Forward-only SCs always have a lower resistance than those with reverse. The other clue that this controller is for racing?—it doesn't come with a battery or motor connectors. Any racing driver who wants to be competitive won't use stock connectors because of their voltage loss, and their absence must mean a cost saving. A quick inspection revealed that the ESC 610 has the following features:

- seven FETs (six for forward, one for brake)
- handles four to 10 cells

THE "SCOPING OUT" LAB

John Rist's lab consists of:

- an oscilloscope
- a digital voltmeter
- a resistor load bank
- a 6V 30-amp electricity supply
- a Pit Stop Radio servo/speed controller tester.

The oscilloscope is used to monitor the controller's output and to guarantee that it's fully on.

The digital voltmeter takes all the voltage-drop readings and verifies the reading on the current meter.

The resistor load bank consists of 40, 12-ohm, 5-watt power resistors, which can be switched on and off one at a time to vary the load between .6 amps and 20 amps.

In series with the resistors is a 25-amp Simpson current meter and a 1-percent .01-ohm resistor. By measuring the voltage drop across this resistor, the current-meter's reading can be double-checked. Of course, the lab power supply provides the test current.



The ESC 610 is slightly larger than the 600 it replaces, but it has torque control. (See text.)

- built-in BEC
- built-in LED for determining full-throttle position
- monster wire for battery and motor hook-up
- three built-in adjustments: neutral, full speed and torque (current limit)
- test point for setting current limit
- instruction book, screwdriver, motor capacitors, heat sink, tie-wraps, servo tape and a flashy Tekin decal set.

I always want to take things apart to see how they're built, and when you hand me a new SC, I have it open in less time than it takes to run a short lap. A few words of caution: I don't recommend that you open an SC unless you're accustomed to working on small, complicated electronic assemblies.

The ESC 610 is bigger than the ESC 600, and I wanted to see whether its case was packed full or could have been made smaller. I removed the four screws from the bottom, slid the case off the top, and it was instantly obvious that Tekin almost ran out of room with this one.

Such cramped installations are usually avoided by electronic manufacturers—not because they're unreliable, but because they require expensive hand labor. I was impressed by the FETs: their leads are bent over and bridged with large amounts

of solder that forms a bus bar that's able to handle a very high current. In general, the ESC 610's innards looked typically Tekin—high quality.

LAB TESTS

Usually, my next step in "scoping out" a speed controller is a trip to the lab to measure its electrical performance, but first, I'll explain how Tekin's torque limiter (current limiter) works. I've tested several SCs with a third pot, but the Tekin ESC 610 is the first I've tested in which it really works. Tekin has accomplished this by designing the third pot so that it sets the output level of a true constant-current source. When you slam the pedal to the metal, most SCs become a dead short, efficiently connecting the battery pack directly to the motor. When a motor isn't turning, it tries to draw huge amounts of current. We've all witnessed this by noting how hot a "frozen" motor gets. This massive current produces a lot of torque that breaks the wheels loose and can cause your car to spin out. If you can keep the car running straight and gaining speed, the current drops off as the motor achieves high rpm. So, we have a powerplant that pulls a lot less current when it's running at full-bore than when it's accelerating under a heavy load.

Understanding this, Tekin has designed a speed controller that can be adjusted to deliver a limited maximum current. In engineering, we call this a "constant-current source." The ideal current limit should be higher than the motor needs to run full rpm, but low enough to limit the motor to a safe torque level (one that won't cause violent, uncontrolled wheel spin). I'll further discuss setting up the torque control when I tell you the results of the road testing, but for now, let's head for the "Scoping Out" lab to see whether the ESC 610 is as hot as the now-obsolete ESC 600.

My Pit Stop radio conveniently allows me to control the SC without having to fight the spring-loaded trigger on my Futaba transmitter.

Before setting up the ESC 610, I read the 20-page, first-class, instruction book. It contains drawings, instructions on installation, transmitter set-up, troubleshooting and operating, and a good discussion of the set-up and use of the torque control.

Most racing enthusiasts agree that low "on" resistance is very desirable in a speed controller. I obtained the "on" resistance by wiring the SC to a resistor load bank and adjusting the current to a hefty 12 amps. I then adjusted the neutral and full-on pots to permit normal operation, set the torque control for maximum current, and used my oscilloscope to verify that the full-on set-point (as indicated by the built-in LED) is correct. The digital voltmeter measures the input voltage and then the output voltage. The difference between these two readings is the voltage loss across the SC, and the resistance is then calculated using the formula $R=V/I$ (resistance equals voltage divided by current).

For comparison, I always take this reading for two setups:

—first, with the full length of wires, as shipped from the factory

—second, I measure the voltage drop at the 2-inch point along the wires.

The ESC 610 doesn't come with motor and battery connectors, but it does have 6.5-inch-long wires. Passing 12 amps of

TEKIN

ESC 610

DIMENSIONS:

Height	0.75 inch
Width	1.6 inches
Length	1.4 inches
Weight (with Wires)	1.3 ounces

TUNING:

Access to Controls	Good
Ease of Adjustment	Fair

PRICE:

Suggested Retail	\$165
Warranty	120 days

ELECTRICAL:

(Manufacturer's Specs)

Max Voltage	14 volts
Min Voltage	5 volts
Max Current	1,410 amps
Continuous Current	350 amps
Resistance	0.0025 ohm

TEST PARAMETERS:

Voltage	6 volts
Current	12 amps
Voltage Drop to End of Wires	0.10 volt
Voltage Drop at 2-inch Point	0.06 volt
Resistance to End of Wires	0.0083 ohm*
Resistance at 2-inch Point	0.005 ohm*
BEC Output, 6-cell Battery	5.73 volts

* Resistance = Voltage Drop/Current

COMMENTS:

The ESC 610 has replaced the ESC 600 in Tekin's arsenal. It's somewhat larger and slightly heavier than the ESC 600, but it has a torque limiter that can help you to avoid spinning out when it's set to match track conditions. The ESC 610's Tempfets guarantee against burnout. It has the same—very low—"on" resistance as the ESC 600. This new version was designed for serious competitors and should serve them well.

RACING BODIES

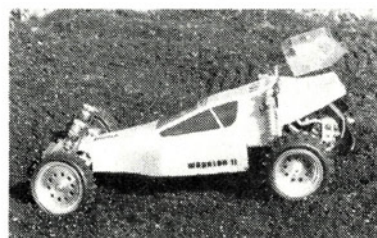
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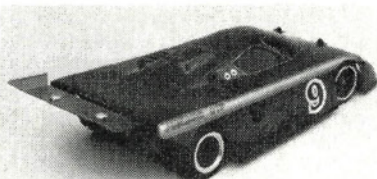
STARFIGHTER™ (AEROSTAR)



THRILLER™ (NISSAN)



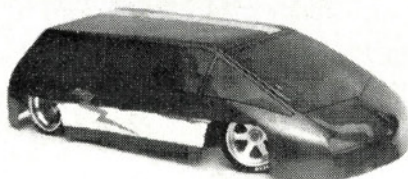
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SCOPING OUT

current through the speed controller, I found this unit had a 0.1V voltage loss, and this gives a calculated resistance of .0083 ohm.

I then measured the voltage drop at the 2-inch point on the battery and motor wires. This time, I recorded a voltage drop of .06 volt, which gives a calculated resistance of .005 ohm. (Tekin claims a resistance of .0025 ohm.) As always, the wires, printed-circuit board and solder joints account for a major part of the voltage drop, and all manufacturers list just the resistance of the FETs. I checked the January '90 "Scoping Out" and found that the ESC 600's resistance was exactly the same, and this isn't surprising considering that both SCs have identical FETs.

My next test is intended to cook a speed controller until it croaks! I pass a hefty 15 amps through it for 15 minutes. I deliberately remove the heat sinks and I do *not* pass any cooling air over the FET cooling tabs. After 15 minutes, the ESC 610 was almost too hot to touch, but it was operating quite normally. I think that if you use

the heat sink provided and install the controller so that it gets plenty of cooling, it won't overheat. Tekin claims that the ESC 610 is burnout-proof, just like the ESC 600.

To test this claim, I dropped a dead short across the motor leads with the pedal to the metal. My current-monitor resistor showed that the controller was handling 45 amps. As you might imagine, things got hot in a hurry! I stood back and waited for the smoke that would indicate a burnout, but was delighted to find that the controller just shut itself off after several minutes. After a brief cooling, the ESC 610 was operating normally again, so Tekin has again produced a bulletproof controller.

CAR TESTS

I searched my hometown hobby shops in Huntsville, AL, for a really hot, but moderately priced, motor and discovered the new Triad motors by Trinity*. The price was right, so I selected the 10-turn model

and installed it and the ESC 610 in my trusty Ultima. The ESC 610 has only three wires for the motor and battery-pack hook-up, but an extra piece of monster wire was included in the accessory pack. This fourth wire is run straight from the battery + terminal to the + side of the motor.

The drawing in the instruction manual shows both a four-wire hookup (as used in the ESC 310) and the three-wire hookup I needed for the ESC 610. I found the drawing a little confusing, but both options are labeled in the diagram. I like the three-wire scheme because it allows me to use the shortest possible wires. The only problem with it is that Tekin uses the same case for both controllers, and there's a hole in the case where the fourth wire would exit. This contradicts Tekin's claim that this case is water- and dirt-resistant.

The pots and the case holes were slightly misaligned, and this, along with the supplied screwdriver's fat body, was unsatisfactory. To solve the problem, I used a jeweler's screwdriver. The pots are plastic, and they completely cover the back of the hole, so there's no danger of a metal jeweler's screwdriver getting into the innards and causing a short.

Armed with several, charged, 7-cell batteries, I headed to a local parking lot. My car sported a set of worn-out, slick, pin-spiked tires because I wanted poor traction. I set the torque control to maximum, plopped the car onto the pavement and punched the throttle. The combination proved completely uncontrollable! The 10-turn Triad has so much punch that I had wheel spin and fish-tailing whenever I tried to accelerate.

I decreased the torque control gradually and accelerated a few more times. This torque adjustment really works! I soon had the car dialed-in and running straight. Tekin provided a test point at which you set the level of the torque limiter. With a digital voltmeter, you can measure the voltage on this test point as you adjust the torque-limit pot.

The test-point voltage varied from 0.001 volt to 0.040 volt. The instruction sheet states that this voltage multiplied by 300 gives maximum current, so if you set the test point to .02 volt, the current would be limited to 60 amps. If you record the level of this voltage, it's easy to adjust it upward or downward between heats. Just

(Continued on page 104)

TEKIN EMR-80 REVERSE MODULE

I'VE OFTEN SAID that if you want to be a competitive racing driver, you need a good, racing-style speed controller (SC) like, for example, the ESC 610. A good racing SC doesn't have reverse because, almost without exception, reversing SCs are bigger, heavier, and have a higher "on" resistance, which is inevitable because the FETs must be divided into four groups to provide the circuitry necessary for transferring the reversing voltage to the motor. No longer are all the FETs in parallel, as is required for the low "on" resistance that's essential to win races.

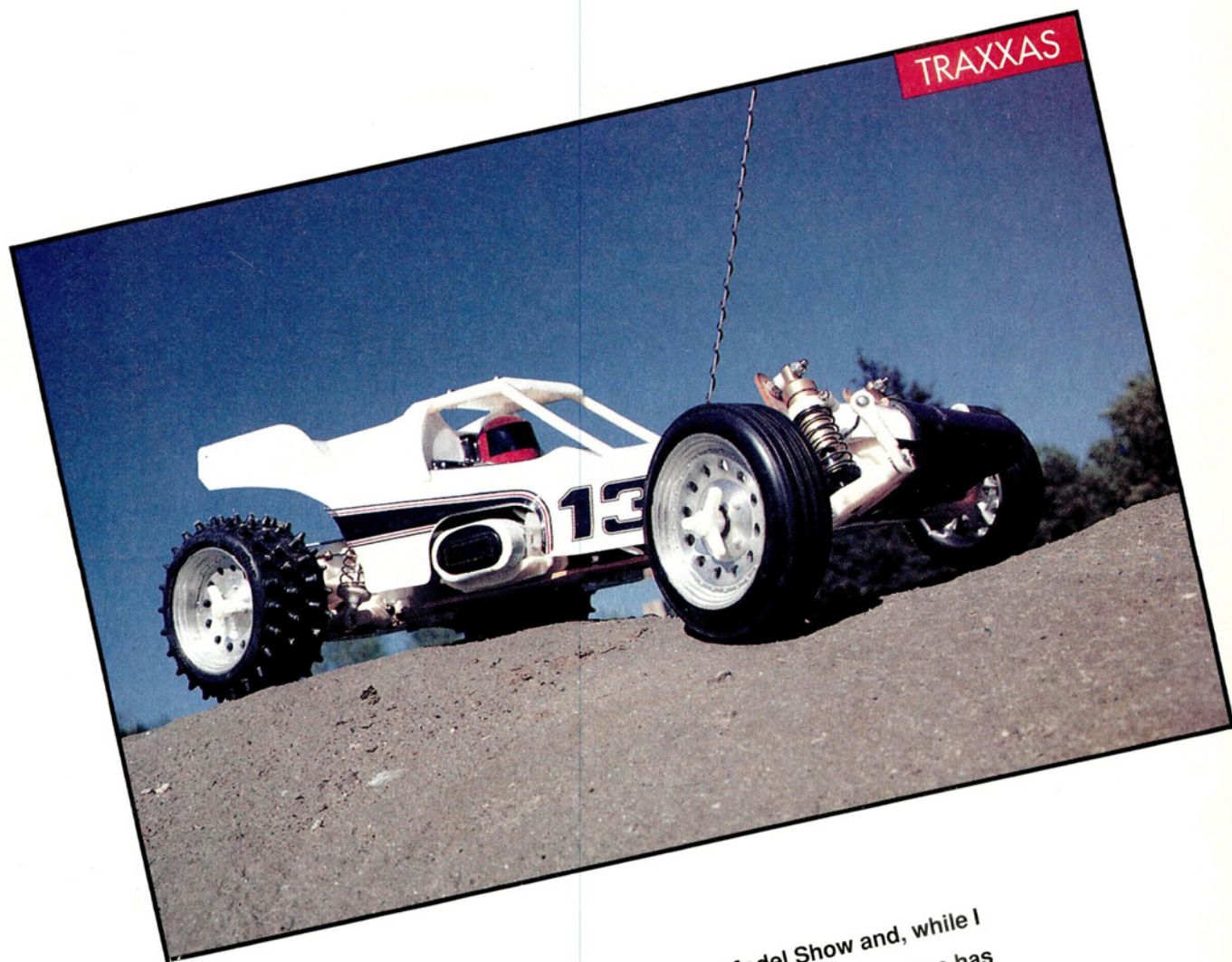
Tekin has come to the rescue with its EMR-80 Reverse Module, which I think gives the best of both worlds: you can now have a smoking, mean racing-style speed controller on race day, but still have the convenience of reverse the rest of the time.

The EMR-80 is easy to install. Simply plug your motor leads into the Module's input leads, then plug the output leads into the motor. The EMR-80 control lead plugs into your receiver's channel no. 2 jack, and the SC's control lead plugs into the top of the EMR-80.

Once installed, the EMR-80 operates in the shift gear mode. Simply push the throttle forward as if you were about to apply the brakes, and wait a second for the EMR-80 to shift into reverse. Your car will now reverse whenever you pull the throttle forward. Just as in forward, you have complete throttle control in reverse because you're using the electronic SC to control speed. Of course, you shift into forward in the same way as you shift into reverse.

Install the EMR-80 when you want reverse for backyard hacking or racetrack practicing; then get the raw race-day power that a forward-only-with-brake racing speed controller can deliver. As I said: the best of both worlds!





ABOUT TWO YEARS ago, I attended the Chicago Model Show and, while I was there, I stopped by the Traxxas* booth. For me, the name Traxxas has always meant the Cat, but at the show, I discovered that a new, 1/12-scale, ready-to-run road racer was in production: the GTP Pontiac Fiero. Neither the Fiero nor the Cat were

R T R bullet

by CHRIS CHIANELLI

breakthroughs in design, but they both had certain unique aspects. At the time, the Fiero was the only ready-to-run, 1/12-scale, on-road racer that had a fiberglass, T-plate chassis. It handled well, and it was a good choice for someone new to road-racing action. The Cat—the Traxxas flagship—was a ready-to-run, entry-level, off-road racer. Although not much different from other live-axle, entry-level cars, the Cat had unique features: a 1/4-inch-thick steel front-suspension cross-member; beefy front trailing arms and a high nylon content in the plastic.

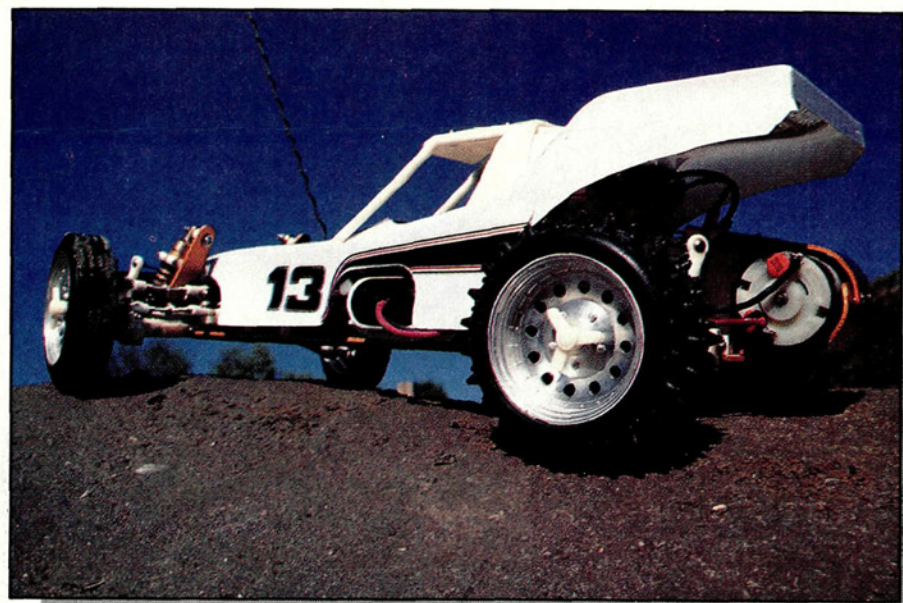
R T R bullet

Six months ago, I attended the Philadelphia Model Hobby Show, and again, I stopped at the Traxxas booth. Their tables were covered with cars, trucks, electric fast-boat equipment and other items, i.e., ball diffs, electronic speed controllers and graphite components. Traxxas was getting serious!

The ready-to-run Traxxas Bullet is the subject of this review. Although a little overweight, the Bullet still represents an effort that's headed in the right direction. (See the June '90 issue of *Car Action* for Lou Andreko's review of the kit version.)

ABOUT THE CAR

The Bullet has borrowed technology from existing off-road cars; in particular, the RC10. With its substantially lower A-arms; upper links complete with turnbuckle; adjustable oil-filled coil-overs; telescopic half-shafts



make it rigid. The upper fiberglass radio plate holds the electronic speed controller and receiver, and both bear the Traxxas name. The basic, pistol-grip Traxxas transmitter worked very well during the tests. The differential is a spider-gear type, and bronze bushings are found throughout. Shock pistons are

exciting, and they're easier to see—an important feature for beginners.

While I'm complaining, I might as well complain about the shocks. They'd have been acceptable, if they hadn't been loaded up with what looked like runny petroleum jelly. It was so thick that the car drove as if it

i n s t a n t



and sway bars; Traxxas's effort to make the Bullet competitive is again apparent.

The chassis is a narrow aluminum plate anodized in gold, and it's bent up at the edges to

also included. The body comes in three (here comes a complaint) very boring colors: ketchup red, mustard yellow and white. Brighter colors would have been better; they're more

had no suspension at all. I took the shocks apart, smoothed the piston shafts with no. 600 emery paper and reassembled them with Kyosho's* green oil in the front and red in the rear. I also

PHOTOS BY STEVE POND

RTR BULLET

Type Off- or on-road
 Scale 1/10
 Sug. Retail Price \$385*

DIMENSIONS:

Overall Length 15.50 inches
 Width 9.25 inches
 Height 5.75 inches
 Wheelbase 10.75 inches
 Front Track 9.25 inches
 Rear Track 9 inches

WEIGHT:

Gross (w/bat.) 56 ounces

BODY:

Type Off-road
 Material Polycarbonate

CHASSIS:

Type Monocoque
 Material T-6 aluminum

DRIVE TRAIN:

Primary Pinion/spur
 Transmission Gear drive
 Differential Gear
 Bearings/Bushings Oilite bushings

SUSPENSION:

Type (f/r) Lower A-arm/upper control link
 Dampening (f/r) Oil-filled, coil-over shocks

WHEELS:

Front: Type 3-piece plastic
 Dimensions (DxW) 2.25x.75 inches
 Rear: Type 3-piece plastic
 Dimensions (DxW) 2.25x1.5 inches

TIRES:

Front Ribbed
 Rear Pin-spike

ELECTRICS:

Motor Mabuchi 540
 Battery 6- or 7-cell flat pack
 Speed Controller Traxxas ESC with reverse

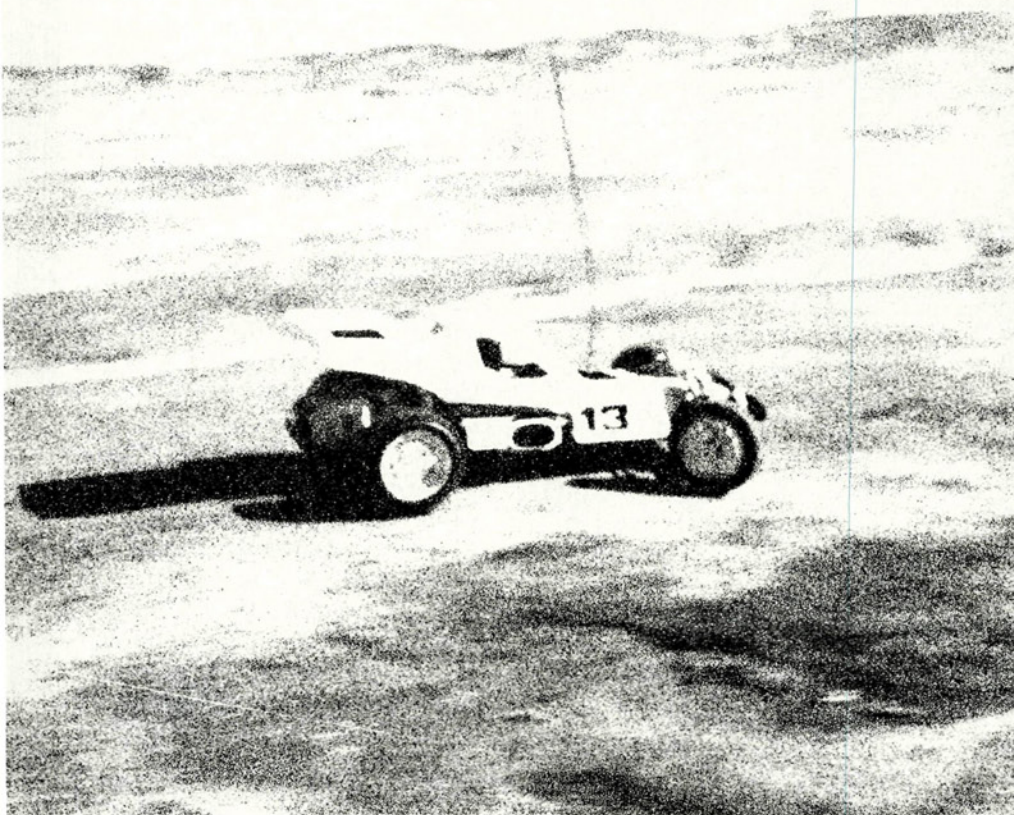
OPTIONS AS TESTED:

Kyosho red and green shock oil; Dura-Trax medium springs

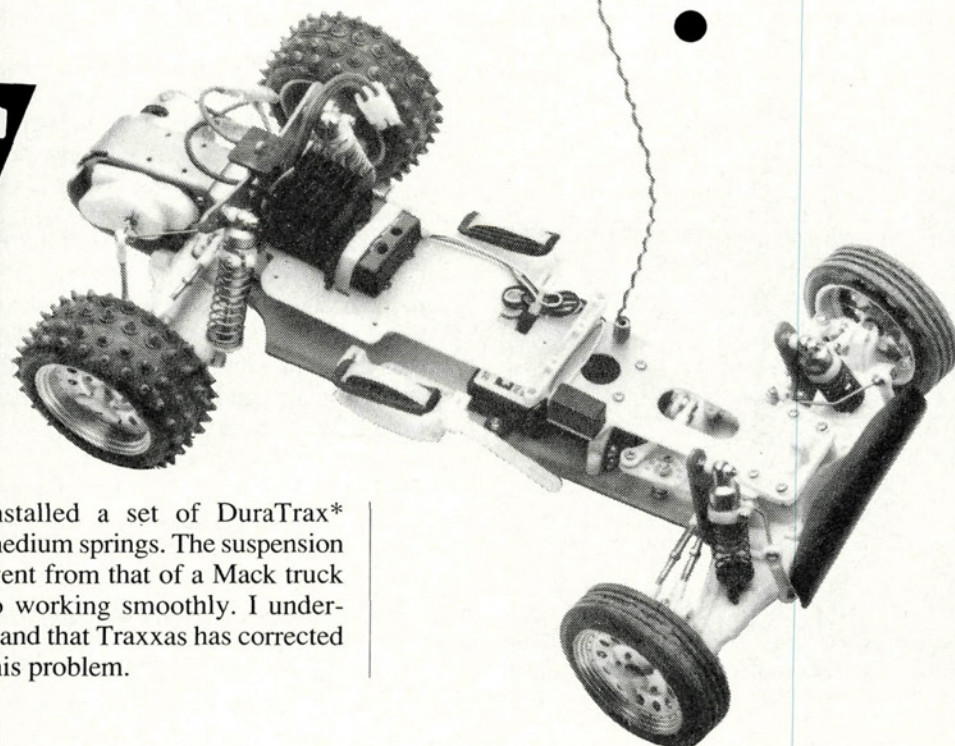
COMMENTS:

The Bullet is a great off-road primer. Lighter shock oil, better springs and spiked front tires help a lot. To shed some weight, use a speed controller without reverse.

*pistol-grip radio included



C a r - m a !



installed a set of DuraTrax* medium springs. The suspension went from that of a Mack truck to working smoothly. I understand that Traxxas has corrected this problem.

PERFORMANCE

Smitty Pond and I headed north to Wasteland Raceway to test the Bullet on the off-road track. The first thing we noticed was that the car begged for more power, but we knew this would be a slow Bullet, since it was 4 ounces over the ROAR limit, and it only sported a Mabuchi 540 motor. It would have been logical to change to a hotter wind; besides, we don't need no stinkin' 540.

The ribbed front tires didn't provide enough traction on the medium- to hard-packed surface, and the car pushed excessively through the turns. I'd like to see Traxxas use the same spiked tires on the Bullet that it used on its Radicator. The Bullet's stock ribbed tires will only work on a soft surface.

With these few changes, a new set of pin-spikes and a stock motor, the car was beginning to live up to its name. The suspension worked very well without bottoming out, jumps were graceful, and with a set of Schumacher* pin spikes up front, the steering was much more responsive without oversteer.

In a future article, I'll work on the 4 ounces of Bullet fat—preferably without using graphite. Yes, it's a little overweight, but so is the stock RC10. The first thing to go will be the radio plate. Other manufacturers in the industry also feel the Bullet is worth its weight, or weight loss. RPM* offers some lightweight A-arms, and Traxxas markets a graphite chassis for \$60.

Since the Bullet was intended to be a ready-to-run competition car, I'd like to see it equipped with ball bearings. Traxxas should dump the reversing electronic speed controller for its better, non-reversing one. (To help offset the cost of the bearings, maybe the motor should be left out, but then it wouldn't be ready-to-run. How about the Bullet EBTM—Everything But The Motor? Never mind!)

Traxxas has come a long way in the past two years, and the next two years should be very interesting.

**Here are the addresses of the companies mentioned in this article:*

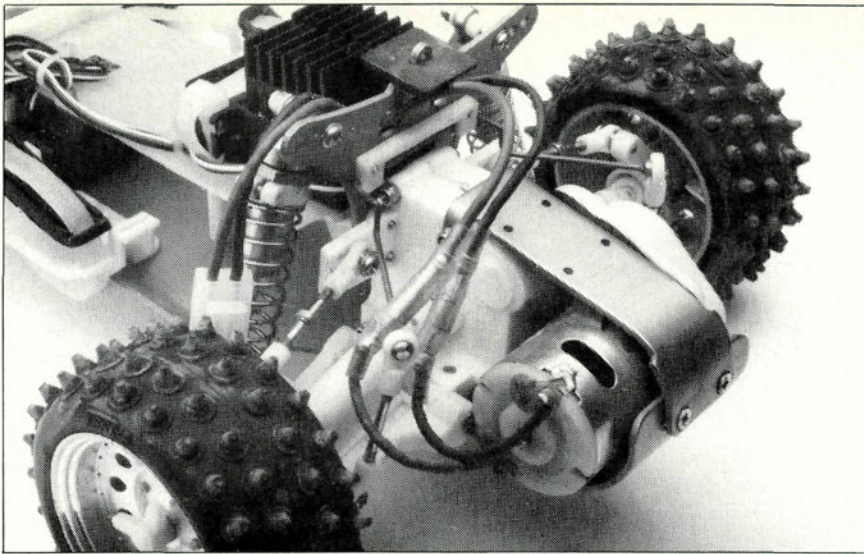
Traxxas Corp., 12150 Shiloh Rd., #120, Dallas, TX 75228.

Kyosho, distributed by Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820.

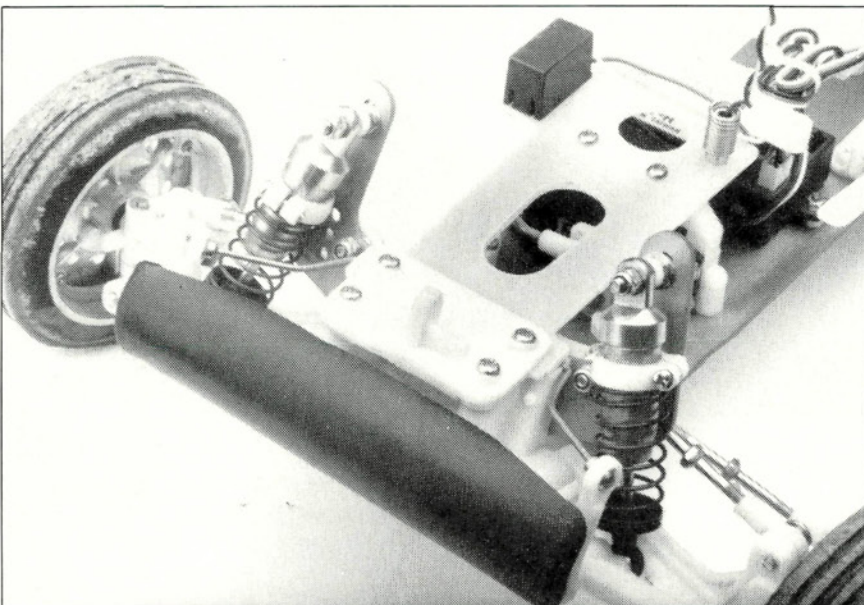
DuraTrax/Great Planes Model Manufacturing, P.O. Box 788, Urbana, IL 61801.

Schumacher USA, 1901 E. Linden Ave., No. 8, Linden, NJ 07036.

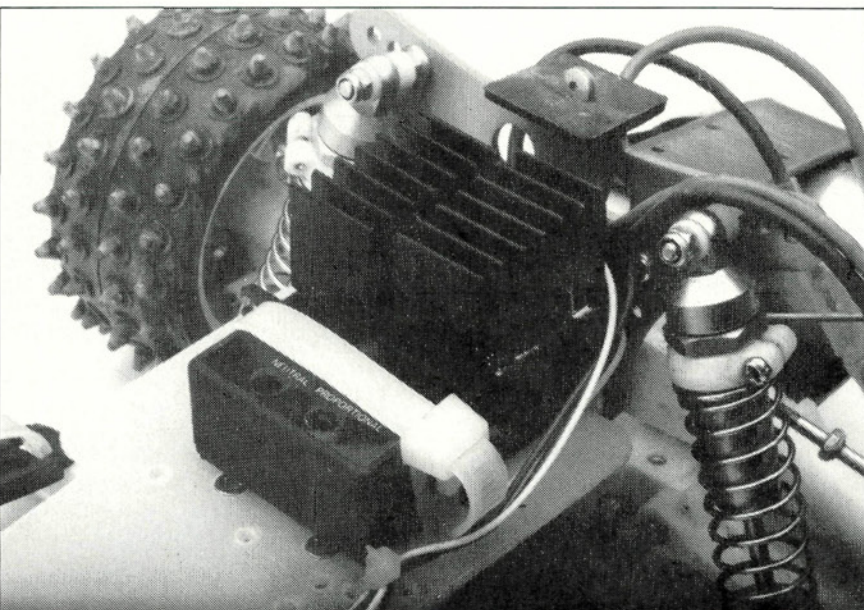
RPM, 14978 Sierra Bonita La., Chino, CA 91710.



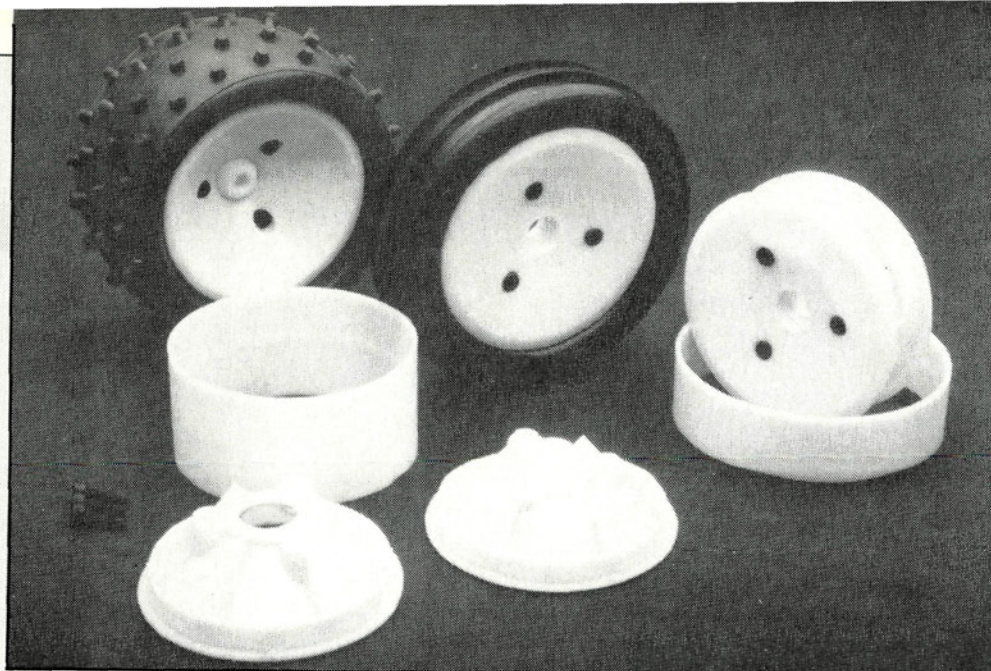
The rear has adjustable upper links and telescopic half-shafts. Rear motor guard is strong. A stock wind would be better than the weak 540.



The front and rear have sway bars and adjustable shocks. Note the adjustable upper links and steering rods. The front ribbed tires work well on soft surfaces.



The Traxxas XL-1 speed controller has reverse, but I prefer the XL-2 no-reverse version. Note the extra shock-tower holes.



by ALEX STROUTHOPOULOS

ASSOCIATED THREE-PIECE RIMS

THREE-PIÈCE DE RÉSISTANCE

EARLY RACE-BRED R/C CARS included three-piece wheels that did a reasonable job of holding the tires to the rims. Soon, however, enthusiasts were shedding weight by using graphite and titanium parts, and the bulky three-piece wheels were next to go. They were replaced by lighter, one-piece wheels, the advantage of which was obvious.

Because one-piece wheels are lighter, it takes much less energy to spin them. Their main disadvantage is that you have to glue the tire to the rim; otherwise, it spins or peels off. When a tire has been glued to a rim, it's there for good; if either is damaged or worn, both must be replaced.

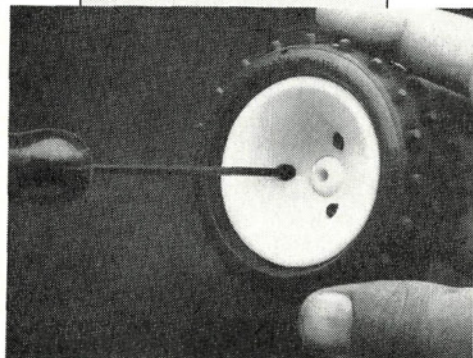
Have you ever heard the saying, "The more things change, the more they stay the same"? Associated Electric* has just reintroduced a three-piece wheel—one that combines the best features of old and new!—and gluing tires to one-piece rims is now a thing of the past!

This new 2-inch wheel has three nylon parts: an outer rim, an inner rim and a center band. The inner and outer halves are molded with small, raised points that act as a "bead lock." When the assembly is bolted together, the points grab and hold the tire.

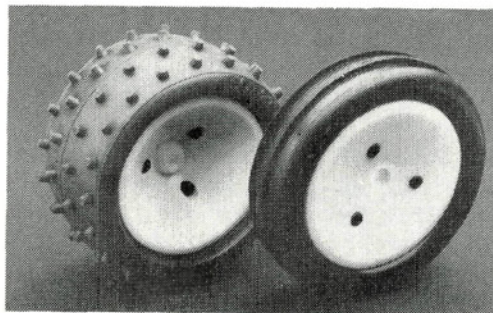
Associated has done an incredible job of designing these rims. They're not only stiffer than the old one-piece rims, but they're also lighter! The benefits don't stop there: both the inner and outer rim halves are dished, and this prevents dirt and debris from being trapped inside the wheel. The wheels are also designed to use $\frac{3}{8} \times \frac{3}{16}$ -inch front-wheel bearings, which can handle heavier loads, and their size is more common, so replacements are easy to find.

The combination of lighter weight, increased stiffness and dirt-repellent sides adds up to a new kind of rim that's a tremendous improvement!

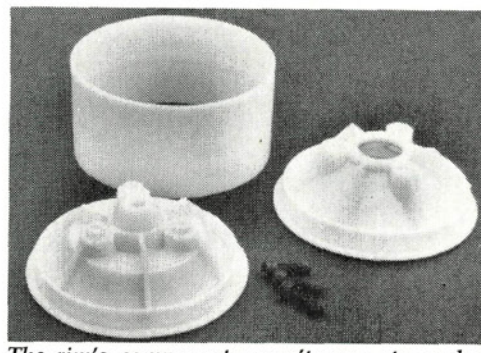
**Here's the address of the company featured in this article:
Associated Electric, 3585 Cadillac Ave., Costa Mesa, CA 92626.*



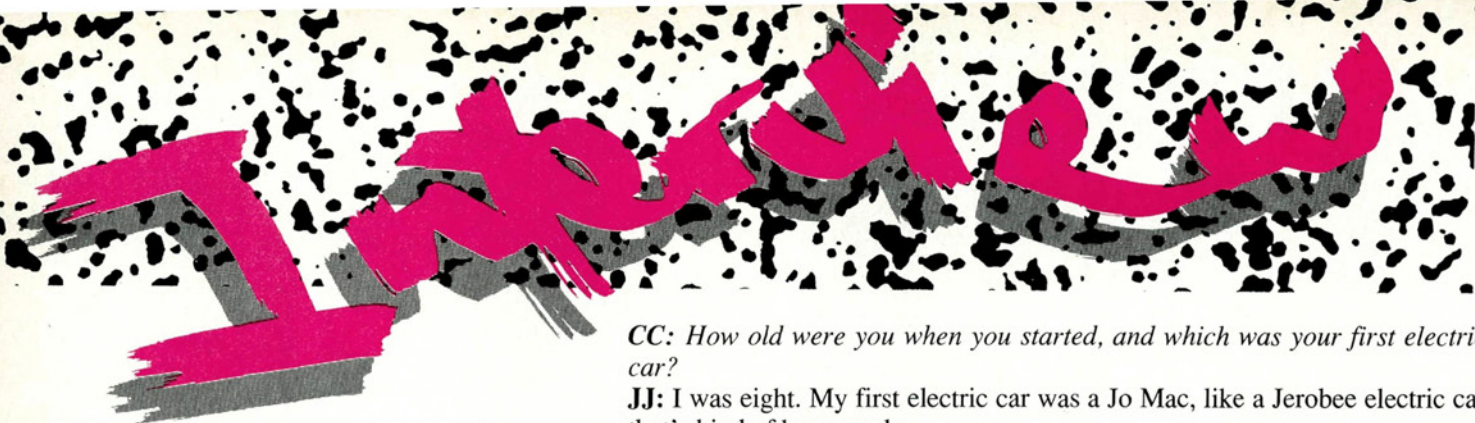
Associated's new rims lock the tires into place when you tighten their halves together.



The completed wheel and tire assembly. Note that both sides of the wheel are dished, so dirt won't build up inside the rim, increase weight and throw the wheel out of balance.



The rim's components aren't very strong by themselves, but when assembled around a tire, they're just as strong as a one-piece wheel!



by CHRIS CHIANELLI

"MAGIC" JOEL

JOHNSON

CC: How old were you when you started, and which was your first electric car?

JJ: I was eight. My first electric car was a Jo Mac, like a Jerobee electric car that's kind of homemade.

CC: Long extinct?

JJ: Yeah; it had an old, straight chassis from the gas-car days, and we bolted an electric motor on the back and used the fuel tray that held the fuel tank. It

had two side pods to hold fuel tanks; that's where we put six batteries.

CC: I think I remember those things.

JJ: They're like white nylons; they're pretty horrible.

CC: Electric conversion.

JJ: Yeah, it was a gas car converted into an electric car.

CC: OK. Enough about the past; let's get right to the present. You've recently made a strong comeback. To what do you attribute that?

JJ: More dedication...I was trying to go to college and race...it didn't work. I decided that while R/C is hot, I'll let college go for a while and devote all my time to racing. That helped out tremendously, and I also started going to a sports psychologist.

CC: Can you elaborate?

JJ: Sure. My tennis coach in college was a sports psychologist, and I talked to him about my racing and how I wasn't doing so well. He asked me if I'd ever done any type of "imaging" or positive-reinforcement-type thing. I said I hadn't, and he said, "Well, you've probably lapsed into something where you've lost your self-confidence." I said, "You're right; I haven't won in a while." I had three ses-

sions with him at his house. It's just deep relaxation and "imaging" of me racing this perfect race. If I made a mistake, in my mind, I'd re-run that corner until I went around it and then finished the race.

CC: In other words, he taught you to let yourself think in pictures and have a positive image of you having already won the race.

JJ: Exactly. He told me to go to my most comfortable track—the one I like best—and think of who's there, then start the race in 4 minutes, just like a real race.

CC: That's wild! Obviously, that's really helped you. You've done really well.

JJ: Yeah. It's been my driving, and my overall confidence is much better now when I hit the track.

CC: You just got back from the Paved Oval Nationals, and I understand you took TQ, but that you had some problems in the Main—tire problems?

JJ: I don't know if it really was a tire problem. They started the race, and then they had a computer failure, and at that time, my tires seemed fine. In fact, the car under-steered in the first corner, and on the re-start, my car took off the line much straighter. It seemed like I had much more traction, but as soon as I went through the

(Continued on page 64)

THE MAN, THE AGGRESSIVE SUPER!





JoeF enjoying the fruits of R/C racing stardom.

first corner, all of a sudden, I just spun out. We're speculating maybe there was a wet footprint from a tire marshall or something, because the grass was all wet from the previous night's rain, and people had been walking all over the track after the restart, so I was the first one through the turns and the first one to hit the bad spot...unfortunately.

CC: *Well, I guess you have to keep that in perspective.*

JJ: Sure. I mean, there's always two weeks from now, and I'll be in another race, and we'll try it again. You can't dwell on a loss. You have to move on.

CC: *You've won many major titles. What keeps you motivated?*

JJ: I want to be the one who wins the most titles ever! I want to end up leaving a mark that nobody else will ever reach. That's what keeps me going. Right now, I have probably twice as many as the next guy, but at the end, I want to have four times as many.

CC: *So you're obsessed?*

JJ: Yeah. I enjoy winning. When I win a race, I don't like winning it by 4 feet; I enjoy burying people.

CC: *Let me change the subject here a little. You started racing in 1/12-scale in the late '70s/early '80s?*

JJ: Late '70s—'76, to be exact.

CC: *How has racing changed?*

JJ: Basically, when I first started, it was 30 guys meeting in the middle of the parking lot. You had to lap-count on your own with chicken scratches on paper. After that, it was your turn to turn-marshall, and you marked chicken scratches on paper to keep track, but you had a stopwatch to time the last lap. It was just everybody out to have a good time. Now, we're into computer lap-counting, we have computer dynos for the motor, and we have matched batteries. Then, we ran the same battery pack all day and kept recharging. We never changed the tires, and you wouldn't do anything to the cars—just bring them back, dust them off and plug into your 15-minute charger, then turn the dial and go.

Now we have \$200 chargers. It's evolved like any other sport. The more technology comes into it, the faster everybody goes and the more serious everybody is. I think it's grown in a good sense; it's gone the way it should have gone, and you know it's gotten there in a hurry. We just need to make sure the organizations and the companies keep up with it and don't let it get too much out of control.

CC: *That sort of brings me to my next question. From this point, can you envision how you think the racing scene could and should improve so that it would affect the entire industry positively?*

JJ: I think racing needs a national body—an organizing body like ROAR, which is now becoming much more organized as the new people have taken over and done an extremely good job reversing the ill effects, because it was horrible. ROAR's getting much more organized, and they're going in the right direction, and that's going to help the industry in that they're formatting the races all the same. They have black ROAR shirts so you know exactly where they are and can find them easily and, once the racing gets organized, there isn't much controversy as far as lap-counting, cars, bodies and rules are concerned. That's going to help the industry; people can go to a race and know exactly what they can and can't do, have a good time and compete and not have to worry that this manufacturer got a break and that one didn't. I know we'll never get rid of all the politics, but we can cut it down. That's when this will become a really good sport and the industry will grow from that. Drivers' rankings give people an incentive to go race.

CC: How do you feel about the Speedworks racing concept? I think it's a positive thing. There should be more events like it to help newcomers to the sport.

JJ: I think it's good; it's trying to fix what everybody's worried about—helping newcomers. The Speedworks races are out there, bringing in the top drivers. There are seminars, and it's the event for the invitational drivers—not a big event...the drivers are there to have fun and not to work on their cars 24 hours a day. I've only been to one; it was in New Jersey at Megatrack, and it was one of the neatest things I've done. It was just nice to talk to people. It was really satisfying that they wanted to listen to what we have to say and took our advice. You could see people improve over the weekend, and it was fun to see.

CC: The readers will get mad at me if I don't ask you about team racing. You've raced for a lot of different teams, and now you're racing for one of the big teams. How is it getting along with everybody, and how are the other teams that you've raced for different from Trinity?

JJ: I've raced for about three teams during my career. I could even count my father as a team, because we had our own race car when we first started racing in '77, and in '78, we made our own car. We were a team, but not a team in today's sense.

My first *real* team was MRP, and that was back when we had four battery packs going into national events. It was laid-back. Our team captain was Gary Kyes, who, as you know, is a very laid-back, have-a-good-time driver. We'd go to the races; we'd have a lot of fun and there wasn't a ton of pressure to win—at least, I didn't feel it, but I was only 13, and it was my second Nationals. There wasn't a lot of pressure; Gary was really good about that: "Hey, you did your best." What else could we do, right? There wasn't any major upset if we didn't win, and it was fun to go racing—not that it isn't fun now, but

it was a lighter type of racing.

CC: There's more pressure now?

JJ: Yeah. I started running for Trinity in '82. I was their first driver. After that, Trinity brought my racing to the level of "We have to win cause it's no longer for fun; we're trying to make a go of this, and if we don't win, we're just coming here for kicks and this is a major deal."

CC: It's a pro act now.

JJ: Trinity immediately brought it to a professional level. We started winning in '83. From '83 to '86, we won just about every race we went to and dominated, but Ernie did the work before we went to the race. He did the work before the race to get there, and then it was my turn to put in the hours and not think about having a good time but worry about winning and then having a good time afterwards.

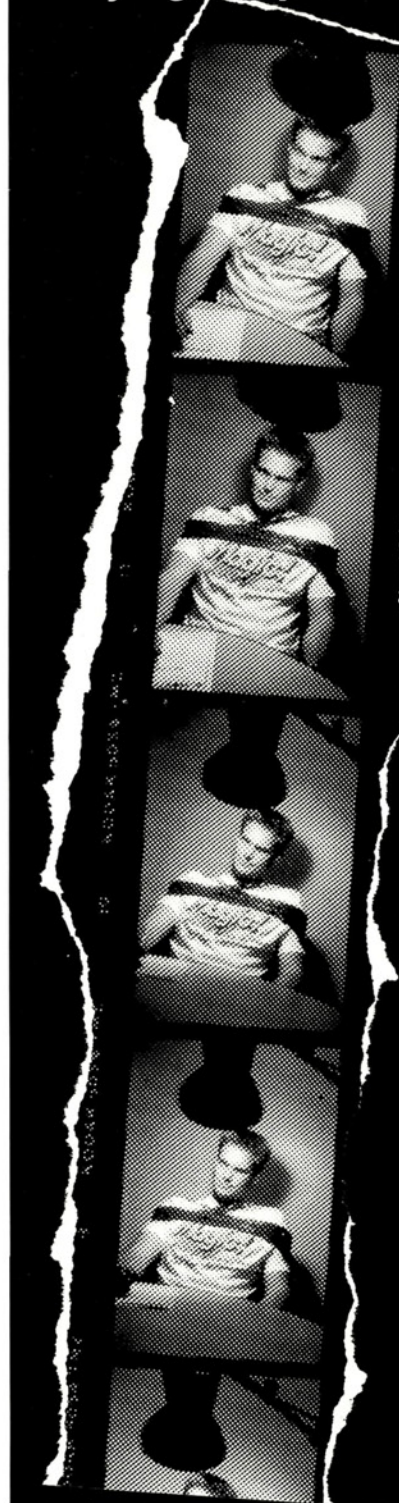
CC: What are the disadvantages of the big team thing? Is there anything you miss about the old days?

JJ: Well, it was kind of fun, we'd show up for a race—just me and Ernie: a one-man team. And it was fun beating Associated's 25 guys. I enjoyed racing on my own, being the only one who's got all the equipment, I kind of enjoyed that. I didn't have to share it with any teammates! Just kidding! I like my teammates.

That's not a realistic approach to racing anymore. You can't show up with one driver and expect to win. You need two or three drivers on a track. Just like in Atlanta: I TQ'd and had I made it to the first corner, I would have had a great shot at winning, but since I didn't, I had two other guys on my team who were capable of winning also. A team!, that's the way you've got to do it; that's how you win these days. I miss being the star, but now everybody has a little of the pressure taken off because there's always someone to back you up if the top qualifier doesn't happen to be right there. Hopefully, the third or fourth qualifier is right behind him.

CC: You're well aware there are a lot

"Yeah. I enjoy winning. When I win a race, I don't like winning it by 4 feet; I enjoy burying people."



Interview

of young talents out there who want to do exactly what you've done. Can you give them any advice?

JJ: Boy, it's the old cliché: practice. You have to practice. You have to get to the major races and get as much experience running big races as possible. When people look at new drivers, they don't necessarily look only at how well they did overall; they look at how the young drivers handled themselves and how they drove their Main. Did they get riled? No one likes a sore loser who throws his transmitter on the ground. Were they steady, or did they choke? The mark of a good driver is how he handles the pressure. If you can't handle it on your own, forget it. When you have a team breathing down your neck, relying on you to win, it's twice as hard. You have to stay cool for your teammates as well as yourself.

CC: Stay cool and focus?

JJ: Yeah. If you don't, that's your worst enemy—and the shakes.

CC: Worldwide, who are the three best drivers in $1/12$ -scale, $1/10$ scale and off-road?

JJ: Worldwide?—that makes it harder. In $1/12$ scale...first, Rick Howart from the USA because he's excellent. Chris Doseck from CAM, and I guess I have to include Masami, since he's world champion. I've only seen him race once, but he does it well.

CC: For $1/10$?

JJ: Pretty much the same guys as $1/12$ -scale—minus Masami I think you'd probably have to add Bob Light.

CC: For off-road?

JJ: Cliff Lett, Jay Halsey and Jack Johnson.

CC: A tough one: who's the best driver you've ever competed against?

JJ: Any scale?

CC: The guy who does it all—across the board.

JJ: Gil Losi Jr. He can drive anything you put in his hands. If there was a big race tomorrow— $1/8$ -scale, $1/10$ -scale off-road, $1/10$ -scale on-road, $1/12$ scale—to see who's best, he'd probably win. He can probably adapt more quickly than anybody I know.

CC: Did you get shaken up by him?

JJ: I hadn't really raced against him at off-road until recently, and we became good friends before that because he raced for Trinity in off-road. I can handle being beaten by him because I respect him and his ability.

CC: The clinic has helped you out with things like that, too?

JJ: Yeah; you have to take it one race at a time.

CC: How do you see the future unfolding for J.J. Johnson?

JJ: I see myself getting deeper and deeper into this as a racer, and in business, with Magic Motor Sports. Racing is becoming my profession; it's what I do. I've taken a few semesters off college to do this, and I'm leaving my house every two weeks for 10 days to go to these races. It looks like something that I'll be doing as a career.

CC: I think you've made the right choice.

JJ: Well I'm glad somebody does. My parents are asking, "When are you going back to school?" School's important to me, and I definitely want to get back because there's no substitute for college, but I want to jump on this while it's hot and get back to school and finish my degree later. I'll feel better about myself.

CC: Now for my "pet" questions. I want you to answer them as honestly as possible. You probably won't like some of them, but they're very important. When watching late-night TV, do you pick your nose?

JJ: I rub it and maybe pick it a little

bit...yeah I'd have to say that I play with my nose. Especially if the air conditioning is on.

CC: Frozen ones? Last time I saw you, your hair was spiked out. Did you have to put a lot of crap in it to do that?

JJ: Not a ton, no; it does it pretty much naturally but when it's long, I have to put a lot of stuff in it. It's short now though.

CC: Good, because your hair was going in my direction when I saw you last, and Ernie hated that.

JJ: Yeah; I was heading out towards Chianelli land.

CC: I was getting worried about you. Do you bathe before or after a race?

JJ: Pretty much before. That way, my competitors don't stay close to me.

CC: I heard that you bathed between heats.

JJ: How did that get out! Damn it!

CC: What's your favorite color?

JJ: I guess it would be hot pink.

CC: Ahaaa, so you like redheads then?

JJ: You could say that.

CC: You don't like blondes?

JJ: Who says I don't like blondes? They're probably my favorites.

CC: What "look" do you like?

JJ: What look? I'm into the school-teacher look.

CC: The Vicky Vale look?

JJ: Yeah, Batman has good taste: librarians; glasses; ponytail. Watch out!

CC: Who's Stacy?

JJ: Stacy is my girlfriend at this point and...

CC: At this point? Is she going to read this? She was very nice when I kept trying to call you.

JJ: Yes, she left me a note saying that you had called and to please call you back.

CC: Glad you did!



Geoff Brabham on pit road at the famous Indianapolis Motor Speedway with the Project Indy MAC Tools car. Our editor was out on the track, doing practice laps in the Indy car (sure!).

For the past two years, Car Action has covered the most spectacular motorsports event in the world: the Indy 500. This year, there was a scheduling conflict with the ROAR Oval Nationals, so I thought my trip to Indy would be scratched. While we like to let our readers know what's happening with



PHOTOS BY STEVE POND

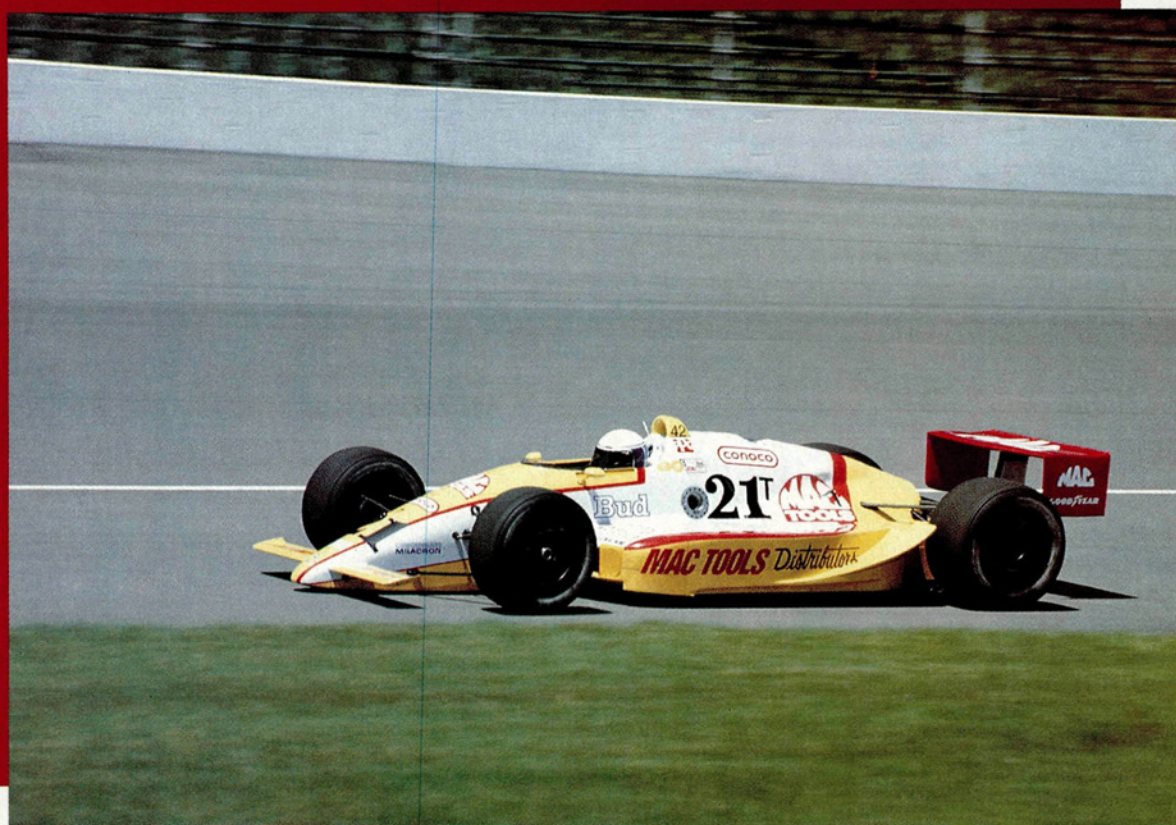
the cars they've been cloning in various scales, we're an R/C magazine, so I thought I'd be going to Atlanta. Then I got a call from Truesports Racing.

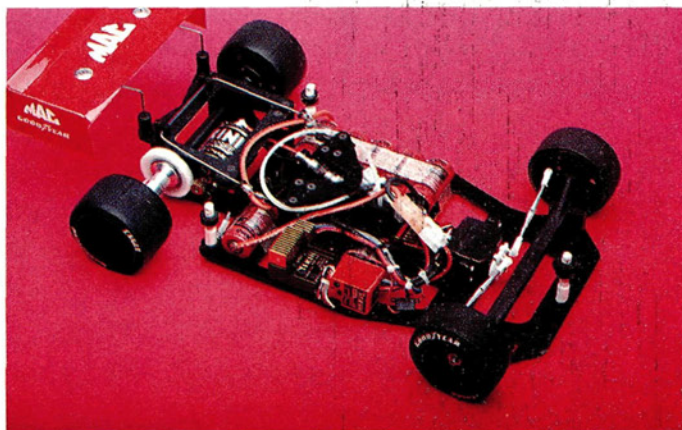
Truesports Racing and Chris Diedling of Graphic Action (a company that works closely with Truesports Racing) wanted us to help build an R/C car based on the MAC Tools Distributors car that was driven this year by GTP World Champion, Geoff Brabham—and they wanted me to take it to Indy! Truesports invited me to go to Indianapolis for one of the qualifying weekends. There, I was to photograph our R/C replica with the full-size car, interview Geoff Brabham and spend some time in the Truesports/Mac Tools pits. I gave this a great deal of thought—about 2 seconds' worth!

MAC ASSEMBLY LINE

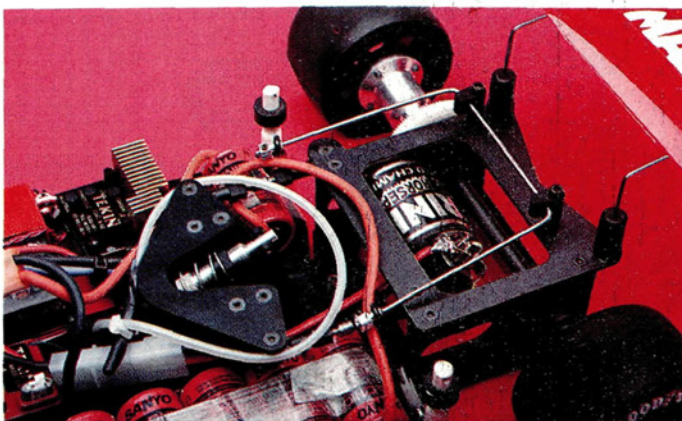
The car was a collective effort: TRC supplied its new Lynx II Sport kit for the chassis and a complete set of custom-made cap tires that were very sticky (in case we got Brabham behind the transmitter for

Big **MAC** Attack at the Brick Yard!





The Lynx II Sport chassis was used for the project Indy car, with a battery setup of 5 and 1 for oval-track racing.



The Sport uses the same floating rear-pod suspension as the Lynx Elite, which is considered the best.

some shots); McAllister Racing supplied the Indy body; Futaba pitched in with a Magnum Jr. radio system; Trinity came up with a battery and stock motor combo; Robinson Racing "pitched" for the gears; and Tekin rounded out the package with an ESC310 speed controller and a reverse module. Chris Diedling assembled the pieces, and Richard Muise of Motion Graphics put the finishing touches on the body. The completed car was at the Indianapolis Speedway when I arrived.

MAC AT THE TRACK

I made it to the Speedway on Friday, just before the first weekend of qualifying, and I was greeted at the Truesports trailer by Tammy Valkoska, Lou Thompson, Chris Diedling and the completed Mac Tools replica R/C car. The sun was shining, so we decided to take the car to the pit area for a photo session. There's usually so much pit activity that I think I could walk the length of pit road with a grenade and receive little attention, but several people did notice our mini MAC machine. We took all the shots on Friday, and this was fortunate, because the rain on Saturday and Sunday almost caused the qualifying to be cancelled.

I stuck it out and saw a side of the Indy 500 that most never see. During the practice, the cars went out for some hot laps, came back to pit road for a few adjustments and headed out for more laps. Right away, it was obvious that even a 500-mile race is still a game of inches, or even *fractions* of an inch. Adjustments were made in such small increments that if

they were performed on a 1/10-scale car, you'd need a micrometer to measure them. The outcome of this type of race becomes a question of who is most prepared, who finds the best combination of adjustments and who can drive—really *drive!* There's no other place in the world where this is more evident.

During the

COMPOSITE CRAFT/TRC LYNX ELITE SPORT

Type On-road
Scale 1/10
Sug. Retail Price \$225

DIMENSIONS:

Overall Length 18.75 inches
Width 9 inches
Height 4 inches
Wheelbase 9.875 inches
Front Track 7.375 inches
Rear Track 7.5 inches

WEIGHT:

Gross (with battery) 42 ounces

BODY:

Type McAllister Indy
Material Polycarbonate

CHASSIS:

Type Pan
Material Graphite

DRIVE TRAIN:

Primary Pinion/spur

Transmission Direct-drive
Differential Ball
Bearings Ball bearings

SUSPENSION:

Front: Type Composite crossbar
Dampening Coil-spring
Rear: Type Floating pod
Dampening Oil-filled, coil-over shocks

WHEELS:

Front: Type One-piece composite
Dimensions (DxW) 1.7x1 inches
Rear: Type One-piece composite
Dimensions (DxW) 1.7x1.5 inches

TIRES:

Front/Rear TRC radials

ELECTRICS:

Motor Trinity Monster Stock
Battery Magic Motor Sports SCR
Speed Controller Tekin ESC 310
with reverse module

GABBING WITH THE GREAT!

Executive Editor Steve "Scoop" Pond talks with one of the world's hottest drivers, Geoff Brabham, who dominated the IMSA sports-car circuit in '88 and '89. Son of famous Formula 1 champion Jack Brabham, 37-year-old Geoff already has an impressive list of victories to boast about—if he were that kind of a guy!



SP: How did you get started in auto racing?

GB: Well, my father raced, and I went around to all the racetracks with him, so you could say I grew up in the racing fraternity. I think if your father does something he's very good at, you either hate it or you love it; I always loved it, and it was something I always wanted to do.

SP: In what type of racing was your father involved?

GB: Formula 1.

SP: Is that where you got your start?

GB: No. He retired in 1970 and went back to Australia. The whole family returned, and that's where I started racing.

SP: What did it take for you to get this far in racing? What kind of sacrifices have you had to make?

GB: That's another easy question; you really have to sacrifice everything, particularly if you haven't got a lot of backing or money behind you. After racing in Australia for a while, we went to England, and I sank everything I had into going over there and trying to get into Formula 1 racing. My wife went over with me, and she worked in England. At that time, she only earned enough to feed us and to try to support my racing.

Eventually, we ran out of money. In Europe, I had enough money to buy one-way tickets to Chicago, so we decided to come over and start again in the United States. Luckily, I won my first race over here, and that gave us enough money to survive the Christmas period. Then I started racing full-time, and it's "mushroomed" from there. But it's hard; it's not an easy profession to make it in.

SP: When you're out on the Indy track doing 230mph, what goes through your mind?

GB: It depends on what's happening. If you're out there getting ready for qualifying, the main thing in your mind is how you can make your car go faster. You try to pick out areas you think the car isn't really working that well in, and you go into the pits and try to make changes. You're forever trying to improve your car. By the time you get to the race, you're just thinking about how to get past the car in

front of you; how you're going to win the race; and what you'll do on the next yellow. There's so much going through your mind. That's different from just getting ready for a race, because once you've started, you have to make instant decisions all the time, depending on the conditions or what's happening around you.

SP: Racing is obviously dangerous. Do thoughts of serious injury, or even death, ever cross your mind during a race?

GB: No, not really. Do you ask a fireman the same question every time he goes to a fire? Do you ask a policeman every time he goes to a riot? Do you ask an airline pilot every time he takes off? Kind of a stupid question!

SP: What are your plans for the future?

GB: I love racing. It's been my whole life, and I'd like to be able to continue as long as I want to. That's really my long-term goal. My short-term goal? I'd

love to win the Indianapolis 500 more than any other race in the world. I hope I'll have the opportunity one day to do that.

SP: Do you have any advice for those who aspire to make it to this level of racing?

GB: Well, if you want it that bad, you have to be prepared to sacrifice everything for it. It's particularly unfortunate that, in this day and age, it takes a lot of money and a lot of backing, and that's the most difficult part, I think. Unless you've got that sort of backing behind you or have access to it, it's a long, uphill struggle, but I think when you get there, it's worth it.

SP: Good luck at this year's Indy 500.

GB: Thanks. ■



LOLA CARS, LTD. SPEEDWAY T89-01

DIMENSIONS:

Overall Length	184 inches
Width	78.5 inches
Wheelbase	113.5 inches
Fuel Capacity	40 U.S. gallons
Weight (minus fuel)	1,550 pounds

CHASSIS:

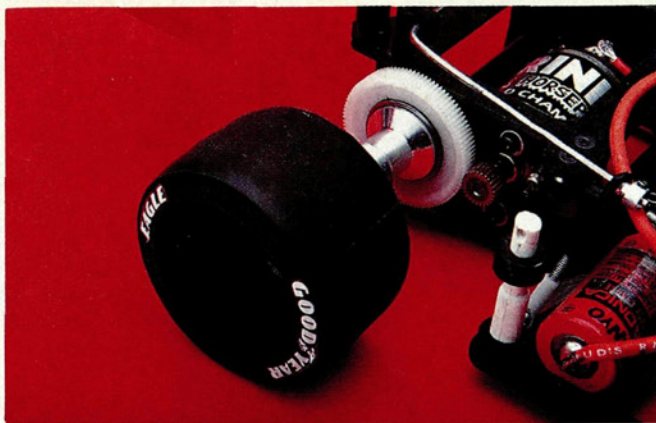
Material	Aluminum honeycomb monocoque with carbon-fiber top section; engine used as a stressed member
Steering	Lola rack-and-pinion; 1 3/4 turns, lock to lock
Body	Carbon-fiber/aluminum and Nomex honeycomb composite
Fuel Tank	Goodyear crashworthy cell between driver and engine
Brakes	4W outboard discs with dual-master cylinders, Brembo four-piston calipers, ventilated AP discs
Wheels	Truesports Mag, cast magnesium alloy
Tires	Goodyear Racing Eagle 25.5x9.5x15 inches (front) 27x14.5x15 inches (rear)

ENGINE & DRIVELINE:

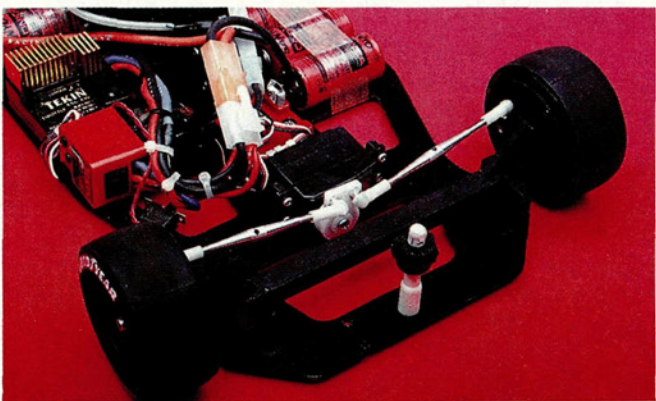
Type	Judd turbocharged V8, double overhead cam, 4 valves per cylinder
Displacement	161 cubic inches
Turbocharger	Garrett
Fuel Induction	Zytek Electronic Management System
Cooling	Aluminum radiator, Stewart-Warner oil cooler, mounted in side pods
Fuel	100% methanol
Power	710hp at 12,000rpm
Transmission	Lola/Hewland DGB, 6-speed with reverse
Clutch	AP Racing 3-plate, hydraulically actuated

SUSPENSION:

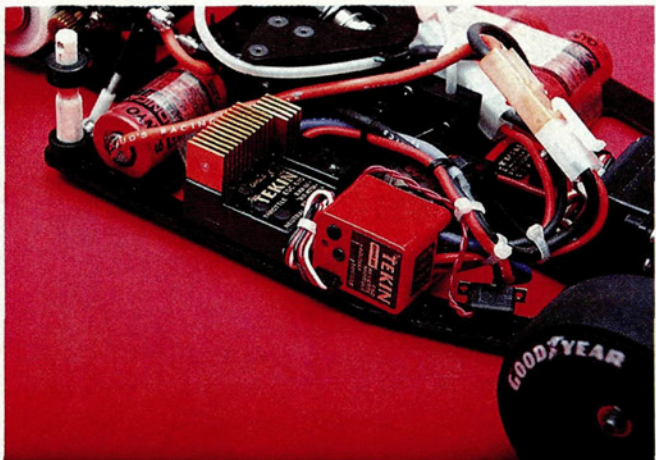
Type (f/r)	Fabricated uprights, fabricated upper and lower wishbones
Front Dampening	Pushrod-actuated inboard dampener/spring units
Rear Dampening	Fabricated upper-track control rod, rocker-actuated inboard dampener/spring units



Puttin' the power to the ground: a Robinson Racing pinion and spur gears, and TRC Radials with graphite filled wheels.



The front-end of the Lynx II Sport is a one-piece design which can only be adjusted for caster with the use of shims.



A Tekin ESC310 speed controller and reverse module (so Brabham could reverse out of trouble) provided a smooth throttle response.



program, we tried to get a transmitter into the hands of Brabham, but as you might guess, his schedule was hectic, and it never came to be. Nevertheless, we had some fun with the car, and so did the people at MAC Tools.

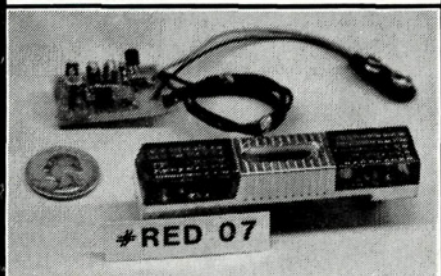
TWO BIG MACS; HOLD THE FRIES

Before showing up at the speedway, the mini MAC machine was at a distributors' banquet where the full-scale Indy car was on display. The full-scale car drew a lot of attention, but the focus shifted toward the R/C version when Chris Diedling fired it up for some blistering passes. Even though the car was equipped with only a stock-class motor, everyone was amazed at its speed. This shows how many have yet to experience the world of R/C cars. It was a breath of fresh air to see big industry like Truesports Racing and MAC Tools get involved with an R/C project like this.

So what's the story with the Truesports Racing Team and Geoff Brabham? This was the only race in which Brabham was scheduled to run the Indy car, so it was all or nothing. Brabham is a very talented driver who has a number of GTP wins and numerous other titles under his belt, but he has always been a "bridesmaid" at the Indy 500. His best finish was a 4th in 1983, and since then, he has competed five times for a variety of teams. This year, he drove the new MAC Tools ride, which is a Judd V8-powered Lola car. His speeds were well into 200mph territory, but the awesome Chevy power was a little too much for the Judd to overcome.

As fate would have it, Brabham could only muster a 19th-place finish, which is respectable, but I know he wanted to finish at the top of the heap. To quote Geoff, "This is a tough business." It may be some time before he's able to tuck a win under his belt, and I hope he does it under the MAC tools banner. They're a great group (and they make some pretty damn good tools!), and with the right combination, they should be able get into the winners' circle in no time. Good luck to Truesports and MAC Tools Racing, and my special thanks to Lou Thompson, Tammy Valkoska and Chris Diedling for this inside look at racing at the Indy 500!

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FOOT SOLDIER

(Continued from page 32)

Likewise, when I saw the color on the Flat Chromate Green, Flat Red and some other odd-looking green, I had them in my hand almost as soon as I realized they were correct. (Looking back on it, the camo-painted aircraft hanging from the ceiling of my local hobby shop might have helped a little.)

There are precise rules and patterns for painting camouflage on military vehicles, but I'm an anarchist (or so I've been told) and, holding those paint cans in my hand, the last thing I wanted to do was wait while I hunted down a rule book. I slipped on an aspirator and goggles (*always* use safety equipment to protect your lungs and eyes when painting—*always!*), closed one eye, squinted through the other and didn't stop until I'd emptied two of the cans. I was amazed—it looked pretty good.

For "armored" protection, I cut some brass sheet down to size for the two side windows, and I laid a few strips of Auto-graphics* window-stripping decals across the windshield. The final touches were the side exhaust stacks, which I borrowed from a 1/16-scale Peterbilt semi-truck model (I never finished the model, but I never throw anything away, either).

The body, gun and stacks looked fine, but sitting there staring at it, I didn't get that impressed, intimidated feeling I wanted. The chrome stacks actually looked great, even if they did destroy the "blending into the background" idea of the paint scheme. Well, as long it was shot to heck anyway, I felt as though I might as well be excessive—no sense thinking small.

The chrome concept had worked quite well on my Maximum Clod Buster, so it was the first thing that came to mind for my Foot. I went back to the Custom Chrome Parts* ad and, sure enough, they had a whole line of Blackfoot chrome items. Well, that's an understatement. They had *every* Blackfoot part chromed. Guess what I got?

When the package arrived, I opened it and was dazzled by the gleam and sparkle. From a work standpoint, I should have been depressed. I now had to completely disassemble my Blackfoot chassis and re-assemble it. All I could manage was a broad smile that didn't seem to go away.

My only disappointment is with the front suspension arms. I use CRP's* rein-

(Continued on page 86)



MY INTEREST in R/C cars was sparked by my fascination with full-size automobiles. I went through a phase of

building display models, and then I moved on to models that I could actually drive. Because I didn't have my driver's license, I thought R/C cars were the greatest thing since sliced bread! Obviously, my interest in R/C cars has stuck with me!

Although my transportation

was limited to a BMX bicycle, I was also interested in power boats. As I watched street-rods pass by the beach road, a thunderboat would occasionally go howling by and interrupt my driving daydreams.

At that time, most high-performance R/C boats were



PHOTOS BY STEVE POND

limited to gas power, which was out of my league, and electric equipment was used primarily in the more docile, scale models. Since then,

advances in electric technology that are primarily the result of the R/C car boom have filtered through to R/C boats. R/C

cars are still my "main thing," but I can't resist getting my feet wet (pardon the pun!) with a high-performance electric boat every now and then!

CESA

SEIZE A KIT

ABC Hobbies and Hobby Dynamics* have teamed up to bring insatiable R/C fanatics the latest in electric-powered swell-screamers—the Cesa U.I.M. Class II offshore electric! The kit is offered with two power options—electric and gas. Because I lack experience with gas-powered boats, I went for the electric-powered kit.

The Cesa's one-piece hull is almost the



CESA

biggest I've seen in an electric-powered kit. To move the boat through the water, a geared drive system is included, and it's powered by two, stock-class, M&Y 540-type motors. The drive is actually a single surface unit with adjustable trim and a unique dogbone coupler like the ones used on R/C cars. Bushings keep the shafts lined up between the motors and the prop; they're not as good as bearings, but they need much less maintenance. The O-ring seals around the output shaft are a welcome feature and keep water out of the hull; most other drives rely

on the shaft lubricant to seal out water.

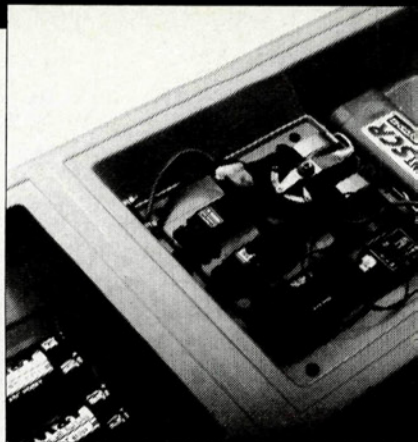
A variable-speed, wound-resistor speed controller is also part of the package, and it's designed to use the same 6- or 7-cell packs as R/C cars. There are two, separate hull compartments to accommodate all the hardware—one in the rear (for the motors and drive unit), and the other midship (for the speed controller, batteries and radio system). Each compartment has a cover that's sealed during final assembly to keep the gear as dry as possible. This is one of the kit's most attractive features, as many others aren't watertight; and you know that water destroys radio gear!

BOAT BUILDING

The assembly begins with installation of the drive hardware in the transom of the boat (the rear, for you land lubbers). The transom in my Cesa kit was warped and looked as if it might

make the assembly a problem, but when I cinched down the hardware, it straightened. The two motors are attached to a central motor-mounting plate that faces the rear of the boat, and a pinion gear is attached to both. The motors drive a single idler gear, which, in turn, drives a third gear that's attached to the output shaft.

The housing for the output shaft passes from the motor mount through the transom, the outside of which must be sealed to prevent water from leaking in. The instructions recommend that you use CA for this, but I chose a silicone sealant instead, because I might later want to remove the drive system without destroying the hull. Also, the gap between the shaft housing and the hull is large enough for thin CA

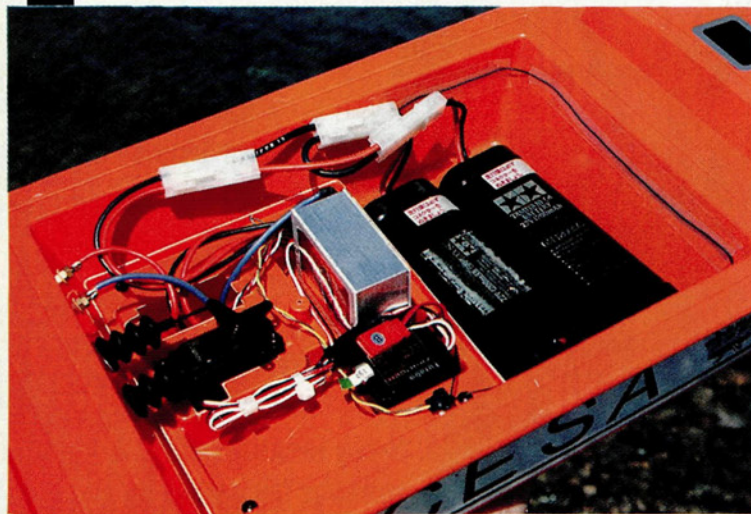


SPECIFICATIONS

Type: Deep-vee
Length: 40 inches
Beam: 8.88 inches
Weight: 4.06 pounds
Hull Material: ABS plastic
Power Req'd: 6- or 7-cell battery pack
No. of Channels Req'd: 2
Sug. Retail Price: \$204.95

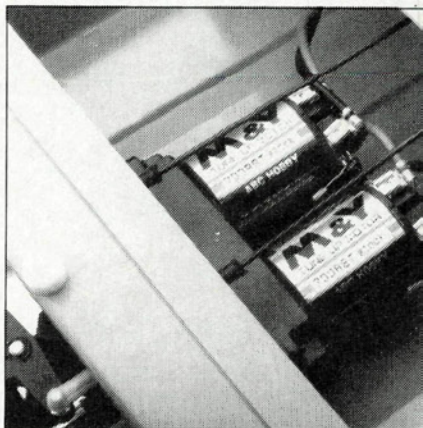
Features: Vacu-formed, one-piece, vee-bottom hull that's modeled after the full-scale boat; twin 540-class motors; single surface-drive unit; wire-wrapped resistor speed controller; very water-resistant radio and motor compartments.

Comments: The Cesa is one of the largest, production, electric-powered boats, and this makes it a little sluggish getting out of the water. Performance improved considerably after I removed the burned-up speed controller and replaced it with a Turbo Zeta and 12 cells, but the running time was cut to a couple of minutes. At speed, the boat had a slight "porpoising" problem. When adjusting trim on the surface drive, I found that the change in alignment causes substantial drag. For proper balance, it's best to move the batteries around.



Top: The radio compartment is set up to cradle one stick-pack lengthwise or two crosswise, side to side, as shown. A Futaba Micro Receiver and a PDI Turbo Zeta speed controller are used.

Above: As well as being protected by the deck, the separate radio and motor compartments have well-fitting protective covers, so everything is kept absolutely dry.



Far left: Here's the stock electronic setup; note the positions of the dry-cell battery pack and the mechanical speed-controller servo.

Left: The stock wiper speed controller handles only seven cells and has no way to prevent the wiper from going off the end of the coil and sticking there in the event of a glitch.

to run down into the hull and glue all kinds of parts together.

Install the radio gear and balance the electrical hardware. There's plenty of room for almost any type of 2-channel radio system, but I pulled out one of my car systems that happened to have micro components. I used a Futaba® Magnum Jr. with the FP-R102H receiver and a pair of optional FP-S9101 water-resistant servos. A radio tray holds the steering and speed-controller servos, the receiver and receiver battery pack, and the speed controller. To mount the gear, screw this tray into the radio compartment with self-tapping screws.

After that, I only had to stick the decals onto the hull. (Also included is a railing to be installed at the front of the hull, but we weight-conscious car racers would rather do without the frills and "eek out" an extra 1/10mph!)

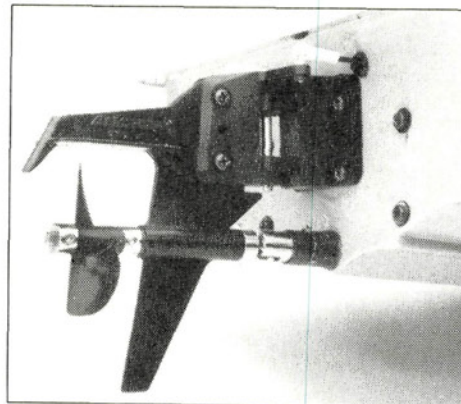
LAUNCHING

For the first round of testing, I set up the Cesa with the recommended hardware, which requires 7.2 volts of power. The instructions state that there's room for two or three sub-C 6-cell packs, and they recommend that you wire them in parallel; this gives 7.2 volts while netting some extended run time. To keep that ever-so-important weight to a minimum, I used only a single pack.

It took some time for the boat to get up on plane, as the surface drive buzzed in a fit of cavitation, trying to make the hull's 40 inches break free of the water. Once on plane, the boat reached a decent speed, but nowhere near what I had expected from the twin motor drive.

To keep this in perspective, newcomers might welcome the boat's docile per-

(Continued on page 106)

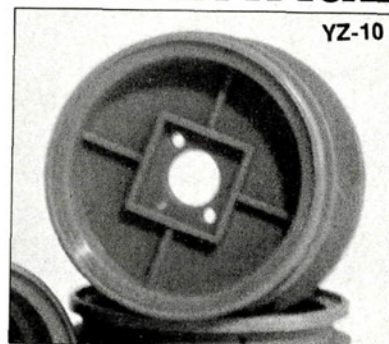


The surface-drive unit has adjustable tilt, but in some positions, it causes excessive drag in turns (see text).

Far left: The two stock-wind motors are geared to a common spur gear in the transmission, which turns the drive shaft. Two O-rings in the drive-shaft tube keep out water.

Left: Bolt-through terminal studs and rubber linkage boots keep the water out. Another set of boots is also found at the pushrod-linkage exit in the stern.

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DON'T Be Counted Out!

by DON HOLUB

Expert tips on setting up for automatic lap counting

IT'S THE FIRST ROUND of qualifying at the ROAR Nationals. Joe Hotshoe just completed the drive of his life! His driving was flawless and his car was a blur on the track. He floated through his marshalling responsibilities as visions of a TQ trophy and a national championship title danced through his head, and after marshalling, he ran to see the posted results. There it was, computer-printed in black and white: two laps DNF (Did Not Finish). First, he had suffered the humiliation of being seeded in the S-Qualifier, and now this! Obviously, the big-name racing teams had discovered he was coming and paid someone to prevent him from embarrassing their team drivers.

As you might suspect, large racing teams did *not* bribe an official to remove Joe Hotshoe from contention. Joe was another victim of the official auto-count system's failure to record all his complete laps. This is common enough to warrant an inquiry into who—or what—is responsible for missing these laps. There seem to be two groups of racers: those who regularly have their laps counted correctly, and those who regularly don't. Again, you might suspect dirty deeds from factory racing teams, but there are factory racers in both groups.

Joe Hotshoe and the other racers who habitually have their lap counts recorded incorrectly usually have only themselves to blame. Although this might be difficult to believe, racers who spend endless hours preparing their cars, radios, batteries, motors and bodies leave their lap-counting fate entirely to chance.

OUT FOR THE COUNT?

Before we jump into preparing your car for the auto-count, let's examine the technology, which we can't deal with if we don't understand. Like the rest of racing technology, with proper preparation, the reliability of lap counting can be improved. The most common automated lap-counting system is manufactured by AMB Products B.V. in Holland and distributed in the U.S. by Bolink*.

This article deals only with the AMB System, which has two major components: a transponder installed in the R/C car, and the pickup coil with its associ-

ated electronics. The pickup coil is placed at the start/finish line—either installed on a bridge over the track or buried underneath it. Transponders are made in sets of 10, and one in each set is designated for each of the 10 possible car numbers.

During a race, the pickup coil continuously transmits a radio signal, and when a car equipped with a transponder approaches it (at the start/finish line), the transponder senses the pickup signal and turns on its own transmitter. (Each of the 10 transponders transmits on a unique frequency.) The electronics attached to the pickup coil monitor the signal transmitted by the transponder until the transponder is out of the pickup coil's range and shuts off its transmission (a maximum of 0.5 second). The specific time the car crossed the start/finish line is computed using this formula:

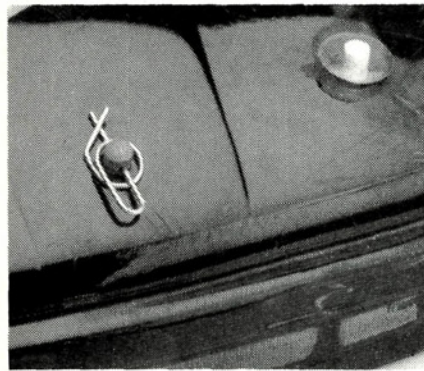
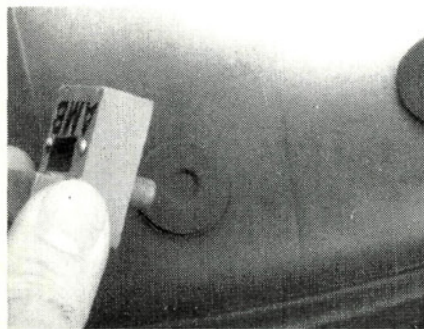
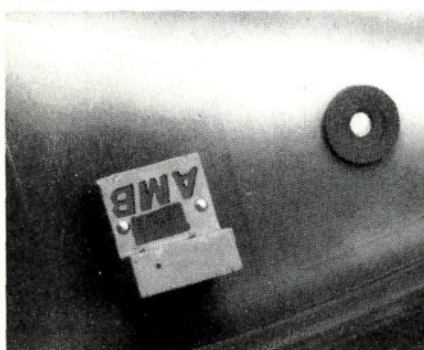
lap finish time = time pickup coil first detected transponder signal + (duration of transponder signal*) divided by 2

*maximum of 0.5 second

As you can see, lap counting is accomplished by a series of high-frequency, very low-power radio transmissions. The range of the AMB radio transmissions is only a few feet, but the range of the car's radio is several thousand feet.

TIPS YOU CAN COUNT ON

With the technical facts in our toolbox, let's examine Joe Hotshoe's car to look



■ Top: In a stock-car body, the transponder should be mounted vertically between the two body posts. ■ Middle: To prevent the transponder from spinning, mount something like Dan's Body Foams around the transponder hole. ■ Bottom: To ensure that your transponder doesn't fall out, use a Bud's Locking Body Clip.

(Continued on page 125)

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FOOT SOLDIER

(Continued from page 78)

forced arms, and Custom Chrome Parts uses the stock arms that wear out too quickly under rough running. They should really have a talk with the folks at CRP and maybe offer them as an option. It did shine, though, and in the process, I threw in a Thorp* ball differential with Tamiya Hotshot-style outdrives and real dog-bones. The stock rubber drive boots still fit over the new bones, and they should be used to keep dirt out of the system.

BIG FOOT

Sometimes, the calmer portions of my mind can anticipate the outrageous side, and this was one of those times. When I placed the order for the chrome kit, I also received Custom Chrome's Clod Buster wheel adapters, chromed Clod wheels and Clod-size tires. To be honest, I was prepared for some problems. Wheel conversions, especially when you're moving up to such massive meats as Clod wheels, can be very unpleasant. I expected some sort of slap-on adapter, and I was prepared for something that was perhaps functional, but not neat.

I was wrong; 100 percent wrong. Whoever came up with Custom Chrome's adapter design should be given a medal for ingenuity and craftsmanship. If, however, you like the idea of putting Clod shoes on your Foot, be aware that they'll hang out a lot farther and weigh slightly more than the stock tires. If you hit the bumps a little too hard, you may find yourself chasing your tire down the street after it breaks off. The moral of the story: if you want to keep all four tires attached to the truck, take it easy when changing to a tire this size.

The adapters are multiple-piece aluminum parts. One section is an intermediate adapter that bolts to the stock axles, and the other section bolts onto the first, to make a firmly mounted wheel extension capable of accepting the Clod hubs and their tremendous wheel offset. Ball bearings (optional, but required) go into the front wheel mounts and permit the Clod wheels to rotate freely. The action is so smooth that it's as near to frictionless as anything I've ever come across. The highest compliment I can give them is to say that I was impressed.

There's one thing you should know if you're using Thorp axles. Thorp changed

the Blackfoot drive hub for a stronger metal version. Apparently, their diff lets you put so much power to the wheels that the original drive hubs cracked every now and then. If you're using this new style of drive hub, make sure you mention it to Custom Chrome. You'll need a slightly different style of intermediate adapter, or nothing will work correctly. You'll also need the alternate hubs, if you're using the Thorp HotShot conversion. The replacement rear-axle stubs are wider than stock, and they won't accept the stock Custom Chrome adapters, either.

FOOTLOOSE

Motive power was a hard choice. The big Clod tires would be a tough row to hoe, so I needed plenty of torque. Also, with that extra mass at each corner, turning them with anything even remotely resembling speed would be a chore.

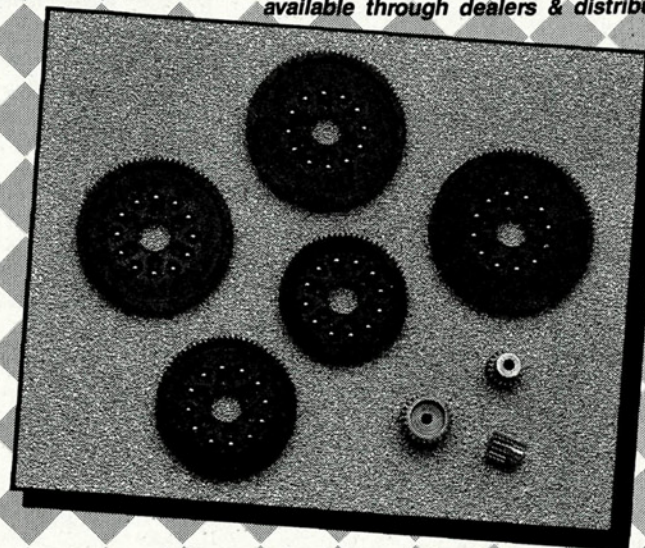
I chose an Astro Flight* Top Fuel motor. This is primarily a drag motor, but it does have good low-end torque, and it can be run with more than the standard six or seven cells. The battery cavity in the Blackfoot chassis is big enough to stuff about nine cells in there from a custom-

(Continued on page 102)

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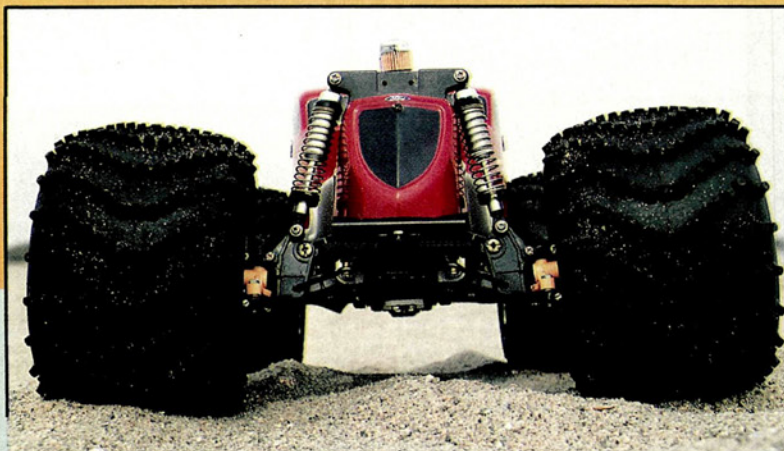
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STROUTHOPOULOS

HOME-BUILT PROJECT

THERE ARE A LOT of Blackfoots out there! Their body colors, tires, electronics and stickers differ, but after you've seen a few dozen, they all start to look alike. When we saw the magic that Dan Gullickson (of Rochester, MN) worked on the standard B'foot chassis, however, we had to feature this awesome work in a photo shoot!



M E A T Y • B E A T

FABULOUS FOOT FEAT

Dan set out to create the "King of the Blackfoots"—one that could crush the rest of the pack and look good doing it. First, he put on a set of DuraTrax* spiked tires that are made to fit the Clod Buster. Any person with an IQ over the speed limit can tell that this is no Clod Buster, so to make the larger tires and rims fit the stock Blackfoot axles, Dan used a set of Bru-Line* adapters.

Dan knew that with the standard RS-540 motor, his Foot wasn't likely to break speed records at the salt flats,



PHOTOS BY STEVE BOWEN

Dan Gullickson's ZZ top concept car



so out it went, and in went a Speedworks* 427 4WD motor. The Blackfoot is notorious for its fragile stock gear train, so for increased reliability, Dan replaced the entire gear set with proven Thorp* units. The combination of a Speedworks motor and Thorp gears provides enough ponies to move the rubber at a good pace!

With such a potent powerplant, Dan knew the stock speed controller couldn't live through even a few battery packs, so he put in a Futaba* 112B. It gives this truck proportional forward and reverse, for utmost control in a variety of conditions.

The stock Blackfoot suspension comprises horizontal friction dampeners in the rear and vertical ones up front.

These wouldn't be tough enough for the terrain where Dan planned to drive his truck, so he ordered a set of short Kyosho* Platinum shocks for the rear and a set of long ones for the front. At first, the shocks didn't fit, so he made *another* trip to the hobby shop and bought a set of JG* fiberglass rear shock towers. These not only change the shocks from a vertical to a more horizontal position, but they also allow you to use a variety of shock absorbers (e.g., Dan's Kyosho Platins). Dan

(Continued on page 95)



DuraTrax tires on Clod Buster rims are tied to the chassis with Bru-Line adapters and give this Blackfoot a super footprint!

PART LIST

NUMBER

Thorp ball differential	4500
Thorp dogbone and axle set	4510
Speedworks 427 motor	0002
Futaba 2PB with 112B ESC	2PB148MJ75
JG rear shock tower	5004
CRP steering knuckles	1618
Kyosho Platinum shocks, long	KYOC5703
Kyosho Platinum shocks, short	KYOC5704
DuraTrax tires	KX1561
McAllister '34 Ford body	B129

Steering linkage was modified to a front position that's more positive and stronger. Author used CRP steering blocks and rods.

With a Speedworks 427 bolted on, the only sane move was to add a Thorp diff, dogbones and axle set.

raised the front shock tower $\frac{1}{4}$ inch. This allowed the shocks a full range of travel, which is vital to a monster truck.

WHAT'S NEXT?!

Monster tires, custom suspension and electrics to make anyone envious—what's left? Steering is a pretty important part of any R/C vehicle, and this truck has one of the most unusual steering arrangements ever seen on a Blackfoot. Because the large tires made the stock steering arrangement practically useless, Dan designed his own, using CRP* front steering blocks, adjustable rods and much of his spare time! Dan's Blackfoot now resembles some full-scale cars in that it's a "front-steer" car.

With all this hardware, how could Dan show the rest of the world that this wasn't just a stock Blackfoot?—with a great body, of course! He painted a McAllister* '34 three-window coupe in the ZZ Top motif and detailed the engine with small air filters.

The result shows what R/C enthusiasts who won't settle for the same old thing can create! Whether the changes are as subtle as a new set of wheels, or as elaborate as this ZZ Top hybrid, we all leave our mark on our machines!

**Here are the addresses of the companies mentioned in this article:*

DuraTrax/Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820.

Bru-Line Industries, Inc., P.O. Box 3786, Center Line, MI 48015.

Speedworks/Trinity, 1901 E. Linden Ave. #8, Linden, NJ 07036.

Thorp Manufacturing, Inc., 380 S. East End, Unit H, Pomona, CA 91766.

Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718.

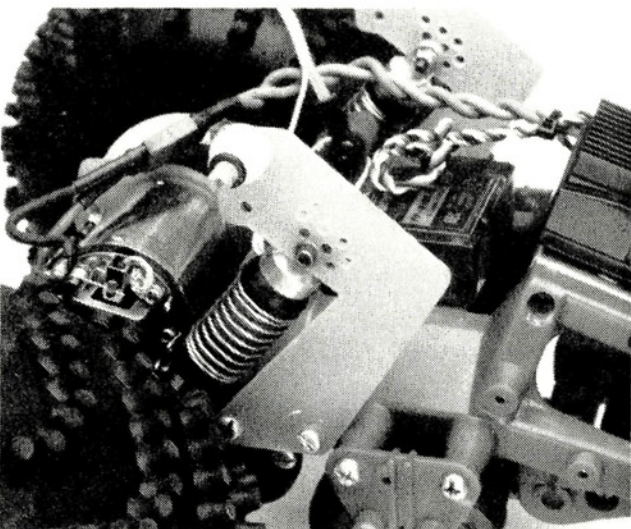
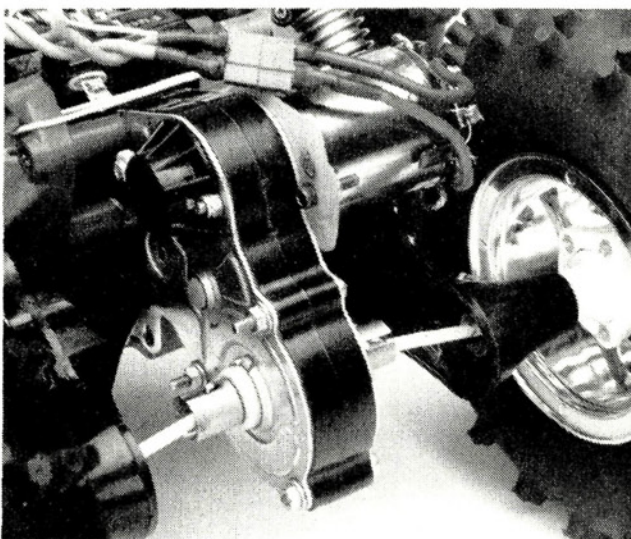
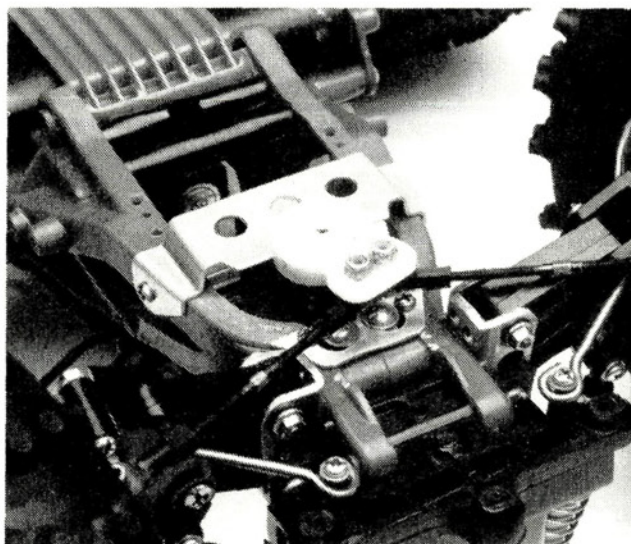
Kyosho/Great Planes Model Distributors.

JG Manufacturing, P.O. Box 6014, Whittier, CA 90609.

Custom Racing Products, 3250 El Camino Real, B-3, Atascadero, CA 93422.

McAllister Racing, 2245 First St., Unit 105, Simi Valley, CA 93065. ■

HOME-BUILT PROJECT



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TROUBLESHOOTING

Welcome to "Troubleshooting"! If you're having a problem that your hobby shop or racing friends can't resolve, give us a shout at Car Action, and we'll see if we can chase down an answer for you. Questions should be of a technical nature and should be addressed to: Troubleshooting, c/o Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897.

POWER TROUBLE

I finished building my Associated RC10 and took it for a test drive. The battery died quickly, so I assumed there was a dead cell. I replaced the batteries, but the same thing happened. I thought the Twister "Carolina Mountain Motor" had eaten all the juice from the two Trinityts (a 6-cell and a 7-cell), so I switched back to my Reedy stock motor, but I had the same problem with my brother's battery pack. Perhaps the problem is my Futaba Attack (AM, 27MHz, salvaged from a previous car), Futaba receiver (FP-R2GS), or Futaba electronic speed controller (MG12B, 6-plug)? What's wrong?

**Colin Bryant,
Studio City, CA.**

When switching to a modified motor, not changing the gear ratio is a common mistake, but you had the same problem with the stock motor. It's highly unlikely that your run-time problems stem from your radio system or your speed controller. Either your car is binding in some way that's causing excessive amperage draw, or you're not completely charging the batteries.

To make sure that the car's drive train isn't binding, remove the motor from the transmission and spin the rear wheels. They shouldn't stop for at least 5 to 10 seconds. If the tranny and the differential seem to be operating smoothly, review your charging method.

It sounds as if you use a charger with a 15-minute timer and only run it around the dial once. After 15 minutes, the charge you'll have will depend on the brand of charger and its maximum charge rate, but in most cases, the battery will be only half-charged. Try winding the timer once more while checking the battery temperature. (Don't leave the battery unattended when charging.) As soon as the battery is warm,

it's fully charged. Before recharging, make sure it's completely discharged and back to room temperature.

UPGRADED DIFF

I've been racing my RC10L for about a month, and I've upgraded the diff to a 64-pitch. Many racers carry an array of pinions, and I understand why—to get different gear ratios. But why do some carry five or six spur gears in all sizes? Is there a difference between a 120-tooth spur with a 30-tooth pinion (which is a gear ratio of 4:1) and a 96-tooth spur with a 24-tooth pinion (also a gear ratio of 4:1)? Does one give longer run times or more speed?

**Ed Walsh,
Middle Village, NY.**

The difference in performance between gear combinations that have the same final ratio is nominal. If anything, the combination that uses larger gears is likely to carry more speed through turns because of the flywheel effect of its heavier pinion. Conversely, the gear combination with the smaller, lighter pinion is more likely to allow stronger acceleration because there's less weight to move. You're not apt to see the difference unless you're actually sitting in the car, however.

A variety of spur gears allows you to adapt your car to almost any motor or track configuration. When changing from stock to modified, you'll probably need a larger spur to accommodate the jump in horsepower. For high-speed tracks, a lower ratio is required; if you run on a low-speed track, you might need a higher ratio. Additional spur gears just make it easier to dial your car to a specific track.

by STEVE POND

STEERING PROBLEM

I bought a Clod four months ago, and I have a steering problem. When I hold up my truck, it steers the way that it should, but when I run it, only the back wheels steer. I have a Futaba Magnum Jr. and an S148 steering servo (like you used in the Maximum Clod in the April '90 issue). I've tried everything—from adjusting the rods to tightening and loosening the front and back steering-spring things. I hope that the staff at the best magazine company in the USA can help me!

Matt Johnson,
Eau Claire, WI.

Steering problems with the Clod Buster are the result of an inherent design flaw: the independent servo-savers at either end of the chassis are the culprits. It isn't that the truck won't turn; it just looks funny when the rear tires are the only ones that do. (When the truck is going backwards, only the front tires steer.) The solution?—lock the servo-savers at both ends and install one directly on the servo. This way, the steering action will be the same for front and rear.

EVERYTHING WENT WRONG!

I recently built an RC10 with ball bearings. I took the electronics out of my Blackfoot and put them in. My Aristo-Craft radio used to work perfectly in the Blackfoot, but after I put the electronics in the RC10, everything went wrong! Even though the servo for the throttle works, sometimes, you have to push the car to get it moving, and even then it stutters and goes pretty slowly. My local hobby shop says that I should buy an electronic speed control or a new radio that has one (like the Magnum Jr.). Is this true? I hope you can help! I use a Reedy SCR, 7.2V, 1200mAh Sanyo power pack.

Brad Niebuhr,
Seattle, WA.



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TROUBLESHOOTING

Your hobby shop's solution seems to be "on track," but I'm not sure you need a new radio. Two things could be causing your problems. The speed controller from your Blackfoot is a wiper controller, and it could be losing contact pressure and causing the stuttering. Another possibility is that a segment of your armature is burnt out, and when you stop on this segment, the car won't move when you give it throttle. A push is necessary to get it moving, and when it goes, the dead segment in the armature causes the stuttering you mentioned.

I recommend that you buy a reasonably priced electronic speed controller, anyway. Using a Blackfoot speed controller in an RC10 is like using a VW carburetor on a dragster engine! If you still have the stuttering problem with an electronic speed controller, check the motor.

UNDERSTEERING LOSI JR-X2

I own a Losi JR-X2 that has the JG oval kit, Robinson 20-degree kingpins, Andy's front arms and Losi H-arms. I

dirt-oval race in the open-wheel modified class, and the car understeers badly when the track is hard and slick. I've tried different tires, differentials, springs, ride-height settings, camber, caster, toe-in, etc. I've considered running foam tires up front and installing a slipper clutch. Any more suggestions?

**Eick Eyrich,
Winter Haven, FL.**

A hard, slick track isn't the ideal surface for turns, but you can take some steps to improve the car's steering. Make sure that you're using the proper oil in the front shocks. Watch the wheels as the car goes through a turn. If they bounce excessively, the shock oil is too light. If the oil is too heavy, the shock won't compress quickly enough on the bumps, and this will cause the front to bounce. In either case, the tires aren't on the ground for as long as they should be, and this hampers steering.

Try putting some "anti-squat" in the rear. (This can only be done with the H-arms on the JR-X2, but you run them.)

This is like putting caster in the rear suspension by tilting the arms back. The increased angle of the H-arms prevents the car's rear from "squatting" under power, and this keeps the front end planted on the ground.

Foam tires might not be a bad idea. More and more, the surface on dirt-oval tracks is so hard and clean that it's almost like asphalt. In fact, Brian Landgraffe recently won the ROAR Oval Nationals running rubber-cap tires with no tread!

ROCK BLOCK

I have a Yokomo YZ-10 with a King Kong engine, and I have trouble keeping stones out of it. So far, I've ruined a belt and a cluster spur gear and chipped teeth on the rear differential. Most of the time, a rock gets caught in the differential and stops the car dead. I don't want to lose a race because of this. Can you give me some advice?

**Justin Brink,
Milford, PA.**

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Make sure that the body and the under-tray (provided you use one) are sealed well to prevent debris from entering the body. If it happens anyway, debris must be getting trapped in the rear bulkhead and then caught up in the belt. Either cut a hole in the rear bulkhead for the debris to pass through, or replace it with the YZ-10 bulkhead that's open in the rear (from RPM, 14978 Sierra Bonita La., Chino, CA 91710). The RPM bulkhead also allows rear-belt adjustment by means of eccentric diff bearing holders.

SHORT-LIVED FLANGE BEARINGS

I own a YZ-10. My problem is that the flange bearings for the wheels (especially the back ones) don't last long, and my wheels have a lot of play. Last week, at the Twister Challenge at Livermore, CA, I had to change the bearings every other heat, and I spent a lot of money! If you can help me, I'd really appreciate it.

John Gonzalez,
Foster City, CA.

There are some steps you can take to reduce wear on your bearings. Make sure you use high-grade bearings (like batteries, there are good ones and bad ones), and keep them clean and well-lubricated.

Either you're exceptionally picky about your bearings, or some problem is causing them to erode too quickly. You might have a bent dogbone, or the steering is traveling too far and causing the universal joints to vibrate and bind. (When the universal joint operates beyond the maximum angle of deflection, it puts very heavy loads on the inside bearing of the steering hub.) Try holding your car in the air and increasing the throttle while turning the steering wheel. If you notice a severe drop in motor rpm when the steering is at its limits, dial-out a little. This will save your bearings and your universal shafts.

10L PROBLEM

Of the five cars I've owned (an RC10, a Bolink Eliminator, a Tamiya Falcon and two Road Wizards), the 10L has been the best, but I've run across a small problem.

I put on a Sassy Chassis rear pod, and it always drops to the car's right when I pick it up. (My 10L is fiberglass, if it makes a difference.) To set the tweak, I have to adjust the tweak screw so much that it doesn't seem right. Can you give me some tips?

Dan Natale,
Westminster, CA.

Right out of the box, the 10L pod dips to the right when you pick it up because the motor is mounted on the right side. (Before you installed the Sassy Chassis pod, the dampening discs might have been a little tight, which prevented this.) Don't be concerned with the way the pod sits when you hold it up in the air. What matters is how the chassis sits when it's on the ground.

To check your tweak, put the car (with the batteries and electronics installed) on a flat surface, and lift the front end with an X-Acto knife held as close to the center as possible. If both front tires come off the ground at the same time, your tweak is flat for that given setup. ■

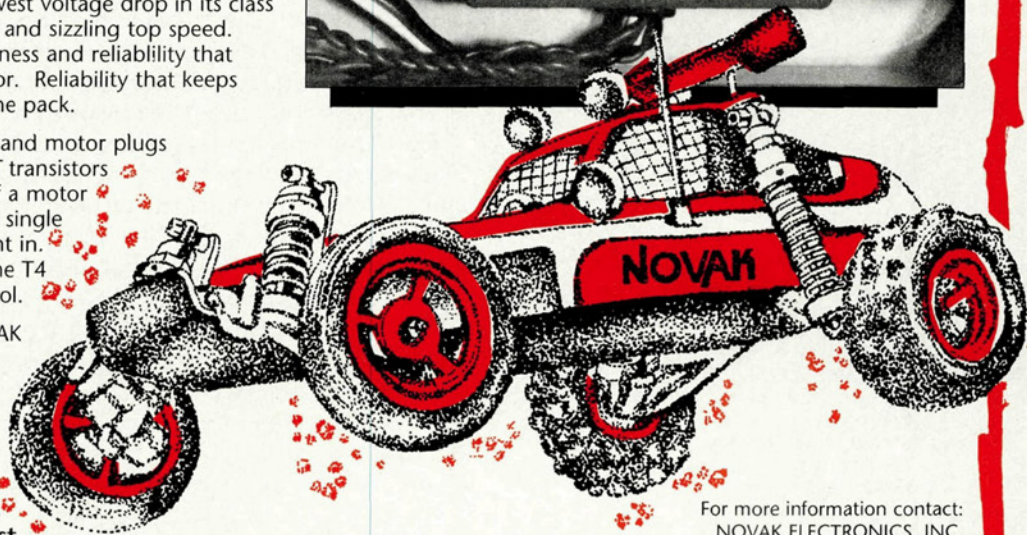
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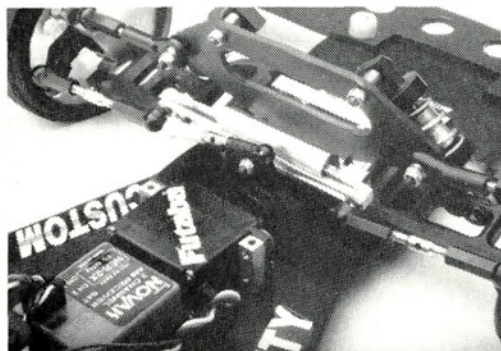
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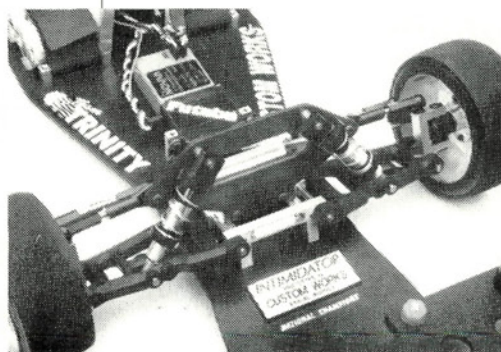
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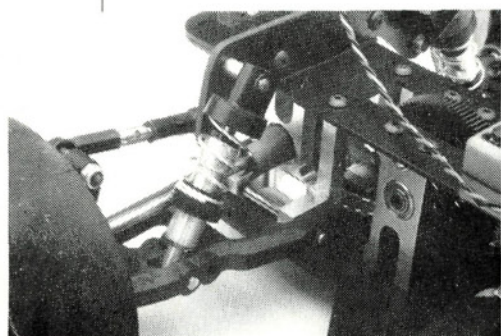
THE INTIMIDATOR



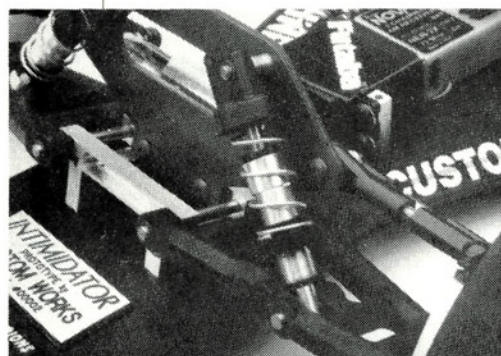
The front steering assembly is as smooth as they come. Notice the precision machining.



The Intimidator's front suspension is like that of an off-road car with independent suspension arms. Because there isn't much need for long suspension travel, the car uses light, Delta-type shocks.



The almost friction-free drive system starts with a pinion/spur and transfers action to the rear diff by means of a small chain.



Many of the parts on this production prototype, e.g., this front suspension mount, are of machined aluminum, but the production version should have lighter nylon parts.



by ALEX STROUTHOPOULOS

A FEW YEARS AGO, the oval racing scene was shaken when a simple, effective 4WD car—the Dominator—was released. Well, Custom Works* has done it again—this time, with its 2WD Intimidator. After producing numerous prototypes, Custom Works has released the final production version—a technical tour de force that was designed to rule the 2WD class. This car has only one purpose: to go fast and turn left.

What makes a car that looks so simple so great? Let's start with its rear end, where people usually look first at the drive system. Like the Dominator, the Intimidator uses a 64-pitch spur gear with a chain attached, but that's where the similarities end. The short chain runs to a rear differential, which the Dominator lacks.

Power is transferred from the diff to the wheels by means of hardened dogbones and Custom Works' trademark, twin-screw wheel adapters—all drilled for lightness. This simple, efficient drive system allows a lot of power to reach the rear wheels with a minimum power loss.

The motor is mounted on the left of the graphite chassis, and that's where it should be for oval racing, but the saddle-pack arrangement is unexpected. The seventh cell is on the right side of the chassis, so it's obvious that a balanced chassis is important. The usual method of holding in the saddle packs with tape is ignored in favor of Velcro straps that are bolted to the chassis. This is an improvement, because tape often tears or is cut when it rubs the ground. Above the motor, there's a graphite radio plate that stiffens the chassis and allows the suspension to absorb the bumps.

Custom Works has also deviated from the norm when designing the Intimidator's steering system, which is a simple, almost frictionless, aluminum, dovetail-type system that works like rack-and-pinion steering.

The Intimidator's suspension resembles those of other cars, but a few features set it apart. The shock absorbers are Delta pressurized units with coil-over springs that can be adjusted by threaded clamps. These small shocks work quite well, but Custom Works knows that it takes more than good shocks to make a great suspension system. Taking their cue from full-scale cars, the designers chose to use rods and arms of unequal lengths. This equalizes camber adjustment throughout the suspension travel. Because this car is designed to run at high speeds, good control is vital, so Custom Works has given the Intimidator 30 degrees of caster. To facilitate

PHOTOS BY STEVE POND

CUSTOM WORKS INTIMIDATOR

Type 2WD dirt-oval
Scale 1/10
Sug. Retail Price \$449

DIMENSIONS:

Overall Length 19.5 inches
Width 9.25 inches
Height 8.25 inches
Wheelbase 11 inches
Front Track 8.125 inches
Rear Track 9 inches

WEIGHT:

Gross (w/bat.) 54 ounces

BODY:

Type Custom Works Rocket Wedge
Material Polycarbonate

CHASSIS:

Type Pan
Material Graphite

DRIVE TRAIN:

Primary Gear
Transmission Chain
Differential Ball
Bearings Ball bearings

SUSPENSION:

Type (f/r) A-arms with control rods
of unequal lengths
Dampening (f/r) Delta oil-filled
shocks

WHEELS:

Type (f/r) Nylon one-piece
Dimensions (DxW) (f/r) 2x1 inches

TIRES:

Front/Rear Foam

ELECTRICS:

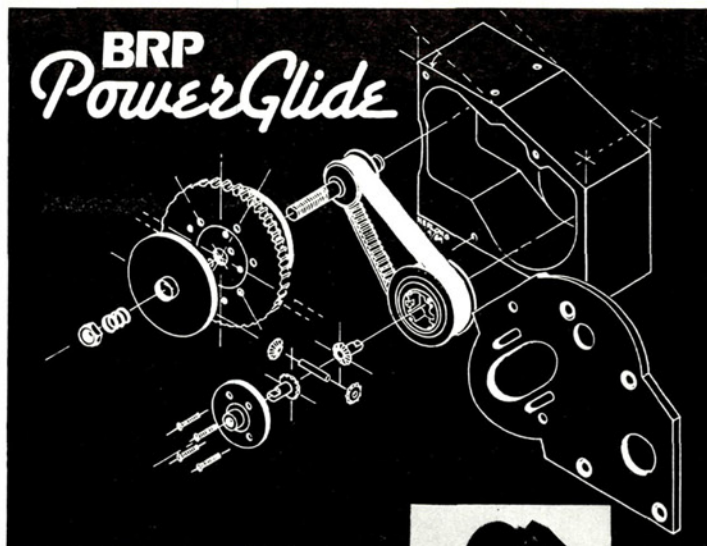
Motor 540/05
Battery 6- or 7-cell saddle pack
Speed Controller Not included

fast, easy suspension adjustments, there are adjustable linkage rods fore and aft. This car is designed to handle all ovals!

Made of graphite, aluminum and nylon, the strong, light parts are well-machined and fit incredibly well. No expense has been spared to make this car as strong, light and fast as possible. The Intimidator could soon be the dominant force in 2WD oval racing. Do you think its competitors are intimidated?

**Here's the address of the company featured in this article:*

Custom Works R/C Products, 3720 Easton Dr., Suite 6, Bakersfield, CA 93309. ■



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Fits:

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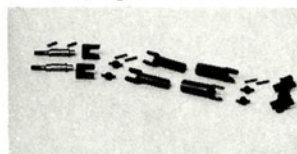
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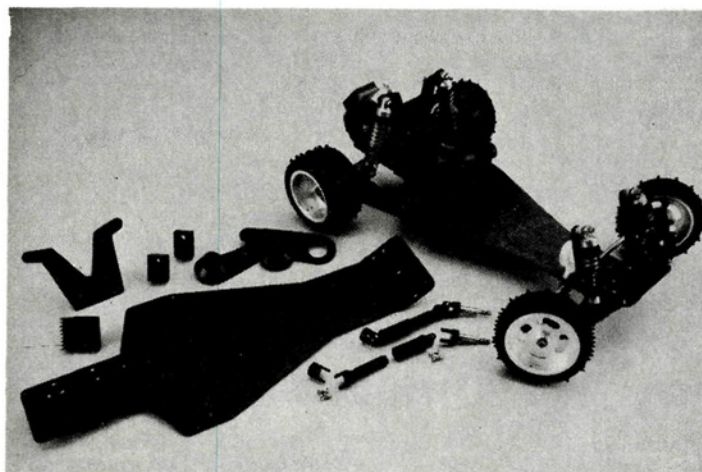
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FOOT SOLDIER

(Continued from page 86)

wired pack. A Novak* speed controller went in to manage the muscle.

One other note of warning: you'll need to steer this beast. The stock steering rods and servo-saver are tough, but they may not be tough enough. I switched over to CRP's heavy-duty steering rods, a giant Kimbrough* servo-saver and an Aristo-Craft* 46-ounce-per-inch 402X servo (only the front wheels turn on a Blackfoot). You don't need to do exactly what I did, but do something similar.

Performance is another matter. With nine cells tucked in there, the truck cruises. It runs at about the same speed as a six-cell, stock Blackfoot. With six cells, the Astro Flight motor is at the bottom of its power band, and the forward motion of the truck is just as fast (or slow, depending on your point of view) as a stock Clod Buster.

If it's not going to run fast, why bother? If you need to ask that question, take another look at the pictures. Do you still need to ask? Watching the Foot Soldier rumble down the road will convince anyone that it's the right Urban Assault Ve-

hicle for the radio-controlled '90s.

Of course, you can't focus all your attention on aggression. At some point, you'll need a quiet, civil truck for those calm family outings. When the need arises, just slip a Mud-Blaster body on that chromed chassis, and you're ready to impress people. The chassis used for both Tamiya trucks are, after all, identical, and that open bed in the back of the Mud Blaster's Subaru Brat body looks as if it would hold a rocket launcher. "Hmmm."

*Here are the addresses of the companies mentioned in this article:

MRC/Tamiya, 200 Carter Dr., Edison, NJ 08818.
Pactra/Plasti Kote Co., 100 Lake Rd., Medina, OH 44256.

Autographics of California, 7401 White Ln., No. 1, Bakersfield, CA 93309.

Custom Chrome Parts, distributed by Horizon Hobby, 3102 Clark Rd., P.O. Box 6029, Champaign, IL 61821.

Custom Racing Products (CRP), 3250 El Camino Real, B-3, Atascadero, CA 93422.

Thorp Manufacturing, 380 S. East Rd., Unit H, Pomona, CA 91722.

Astro Flight, Inc., 13311 Beach Ave., Marina Del Rey, CA 90292.

Novak Electronics, Inc., 128-C Dyer Rd., Santa Ana Rd., CA 92707.

Kimbrough Products, 1430 East St. Andrews Place, Unit F, Santa Ana, CA 92705.

Aristo-Craft/Polk's, 346 Bergen Ave., Jersey City, NJ 07304.

F-1 FERRARI

(Continued from page 40)

full-scale car as it goes around the turns and accelerates. The gearbox sounds just like the high-revving V10s and V12s of the full-scale F-1 cars. I was sorry that I could run only a few packs before it got dark.

Next, I tried the car at a local carpe track. Instead of rubber tires, I used the larger DuraTrax* foam tires and, with these, the car accelerated a little more slowly due to the high gearing, but it was a demon at full speed. With its fully independent suspension and well-balanced chassis, the car hugged the inside line of the turns, and I put it anywhere I wanted. It's great!

No matter which tire compound I use on carpet, the suspension does its work because it's more advanced than you might suspect. You can adjust for tweak by lengthening the tension rods, and all this is explained in the "tuning tips" section of the instructions.

This great car was easy to assemble; it handles well on a variety of tracks; and it makes me feel as though I could take the

(Continued on page 104)

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8002	RC-10L Basic GR with Bearings	149.81

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F-1 FERRARI

(Continued from page 102)

inside line against drivers like Ayrton Senna and Nigel Mansell! What more can I say?

Does it go 1,000,000 miles an hour and turn like a slot car? Is it better than any other car on the market for half the price? No; but it isn't meant to be. Sure, on the performance end, it could use some tune-ups. The soft rear suspension causes the rear to drag on the ground occasionally, and there's a limited choice of gearing with the compact gearbox. The included plastic bushings aren't ideal for all-out running, but to keep this in perspective, they do keep the price of the kit down, and this makes it more affordable for enthusiasts who don't care about ball bearings, 35 possible gear ratios, or a ball differential. Kyosho wanted to produce a scale car that enthusiasts could identify as the one they saw during that race on TV. Its better-than-average scale-car performance is just a bonus.

**Here are the addresses of the companies mentioned in this article:*

Kyosho/Great Planes Model Distributors, 1608 Interstate Dr., P.O. Box 4021, Champaign, IL 61820.

Coverite, 420 Babylon Rd., Horsham, PA 19044.

DuraTrax/Great Planes Model Distributors. ■

SCOPING OUT

(Continued from page 46)

use your voltmeter, which allows you to make small, predictable changes without using your transmitter. (At most races, transmitters are impounded.) With practice, you should be able to find the setting that limits acceleration to a controllable level without restricting your car's top speed.

It's easy to set the torque control if you understand that when you punch the throttle, the motor tries to pull huge amounts of current because, for an instant, it acts as though its armature were stuck. This huge current produces the large magnetic field that causes a motor to accelerate wildly. When a motor turns more rpm, it pulls less current, so if you install a smaller pinion gear that allows the motor to turn faster, run times increase because current draw is reduced. If you're careful, you can set the torque control, which is really a current-limiting circuit, low enough to avoid nasty spin-outs on slippery curves; but it will be high enough to allow enough current to run your motor flat out on the straights.

I ran one more experiment before calling it a day: I adjusted the torque control

to minimum. Believe it or not, the control has such a large range that it had my screaming car running as though it were a dime-store special powered by flashlight batteries!

A few more words of warning: for the test, I deliberately ran without the heat sink. When the ESC 610 is run in the current-limit mode, it works particularly hard and gets pretty hot. I highly recommend that you use the heat sinks and keep the controller well ventilated.

The ESC 610 is only 0.1 ounce heavier, 0.5 inch thicker, 0.1 inch wider and 0.3 inch longer than the ESC 600 it replaces, and its torque control really works. If you run 1/12-scale cars, you might want a smaller speed controller, but the ESC 610 isn't really big or heavy, and it will fit almost any car or truck. My measurements of the ESC610's resistance were the same as those obtained with the ESC 600. It's clear that Tekin discontinued the ESC 600 and introduced the ESC 610 because this is a truly *hot* racing speed controller that will be a strong weapon in anyone's arsenal.

**Here are the addresses of the companies mentioned in this article:*

Tekin Electronics, 970 Calle Negocio, San Clemente, CA 92672.

Trinity, 1901 E. Linden Ave. #8, Linden, NJ 07036. ■

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proven design allows it to slice confidently through rough water with unmatched stability.

The assembled Villain IV is completely ready-to-float with a two-channel radio system and heavy-duty FWD/REV electronic speed control. Villain IV is also available as an easy-to-assemble kit which accepts all other component two-channel radio systems. If mind warping speed is your intent, ask your hobby dealer about inexpensive modifications which allow Villains to reach radar-clock speeds of up to 26 MPH (so far!).

Villain IV™

SPECIFICATIONS

HULL	"Deep V" Offshore racing
WEIGHT	3.5 lbs. (w/o batteries)
LENGTH	31" Overall
BEAM	8.25" Overall
DRAFT	4.5"
DEAD RISE ANGLE	22 Degrees
MOTORS	Twin RS-540S With Aluminum Heat Sinks
DRIVE SYSTEM	Adjustable 2:1 gear Steerable Outdrives Counter-rotating Props
OILING SYSTEM	Built-in
PROPELLERS	Surface Piercing
TRIM ANGLE	Adjustable
SPEED CONTROL	Model 1501 - 4 Step FWD/REV Mech. Model 1508 - FWD/REV Electronic
RADIO	2-CH Stick Radio
BATTERIES	(1) or (2) 6-Cell
STAND	Mahogany (included)
APPROX. RUN TIME	8-12 Min. (2) 6-Cell 4-6 Min. (1) 6-Cell

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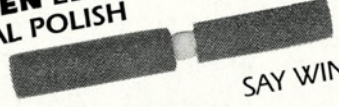
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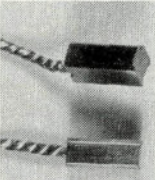
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CESA BOAT

(Continued from page 83)

formance; even a "greenhorn" could run it at full speed without much chance of it flipping over! The Cesa will tolerate a beginner's lack of transmitter prowess, and in this respect, it's the most user-friendly boat available. Unlike other beginner boats, the Cesa has plenty of room (and I mean *plenty!*) for you to make modifications without exceeding its design limitations.

DISASTER AT SEA!

After only a few minutes of the Cesa's maiden voyage, I encountered a radio glitch that sent the large wiper part of the stock speed controller right off the end of the resistor! This was a radio problem, but the speed controller shorted out and burned up, leaving me no choice but to wait for the boat to float to shore, or swim out and get it! There's always the potential for radio interference, so there should be some type of positive stop on the speed controller to prevent it from traveling too far and burning up.

The loss of the stock speed controller

(Continued on page 114)

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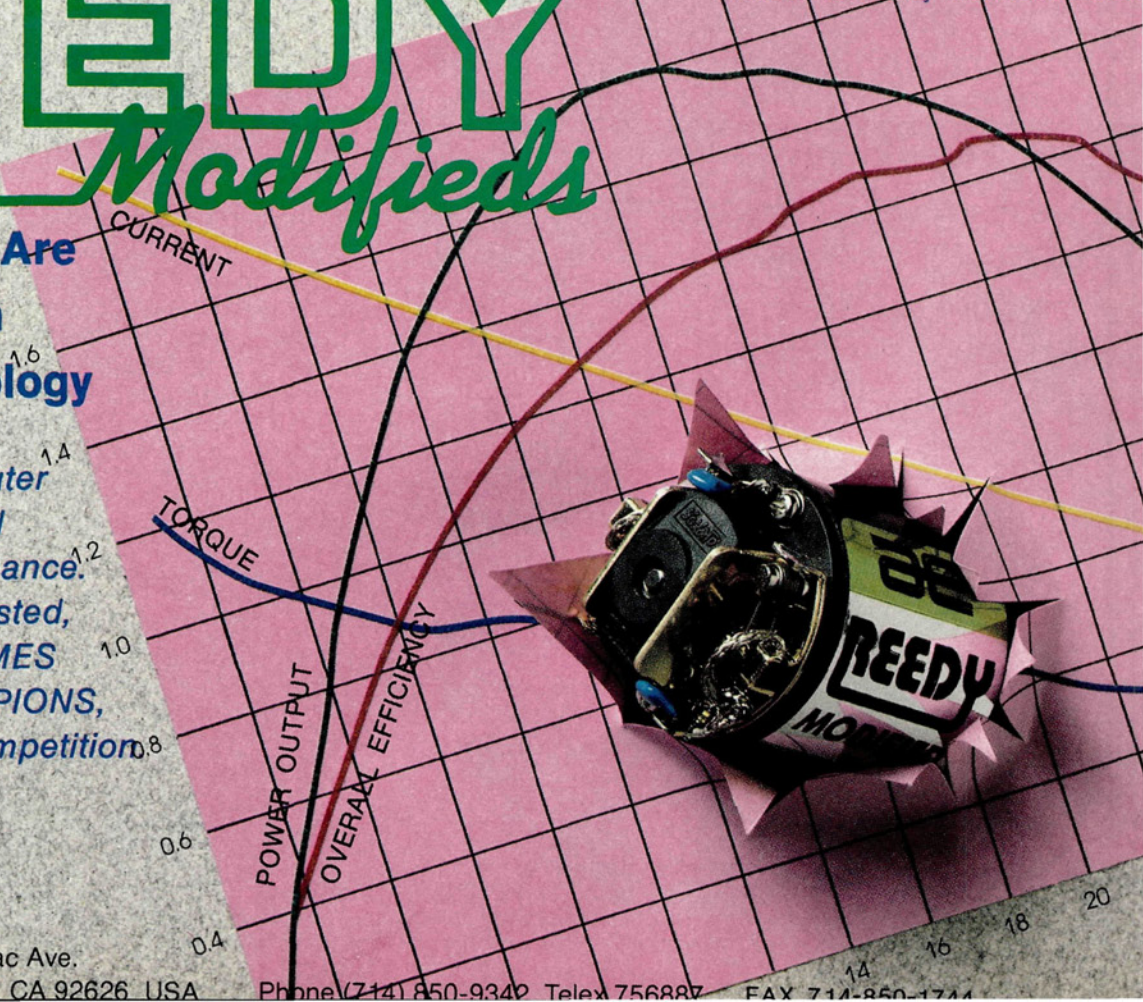


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(Graph shown represents actual readout of Reedy Modifieds motor.)



WEAPON: LYNX II EL

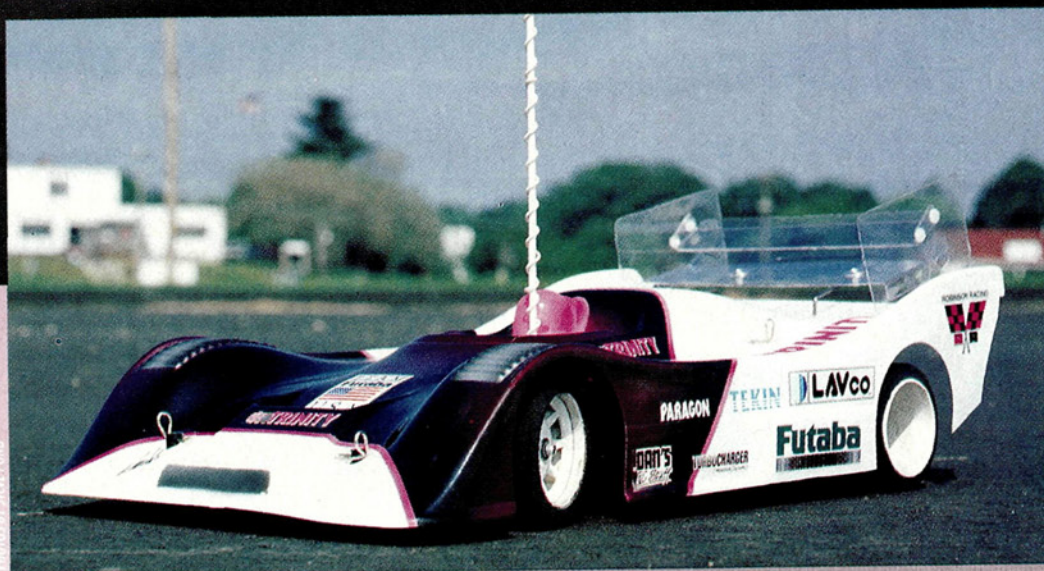
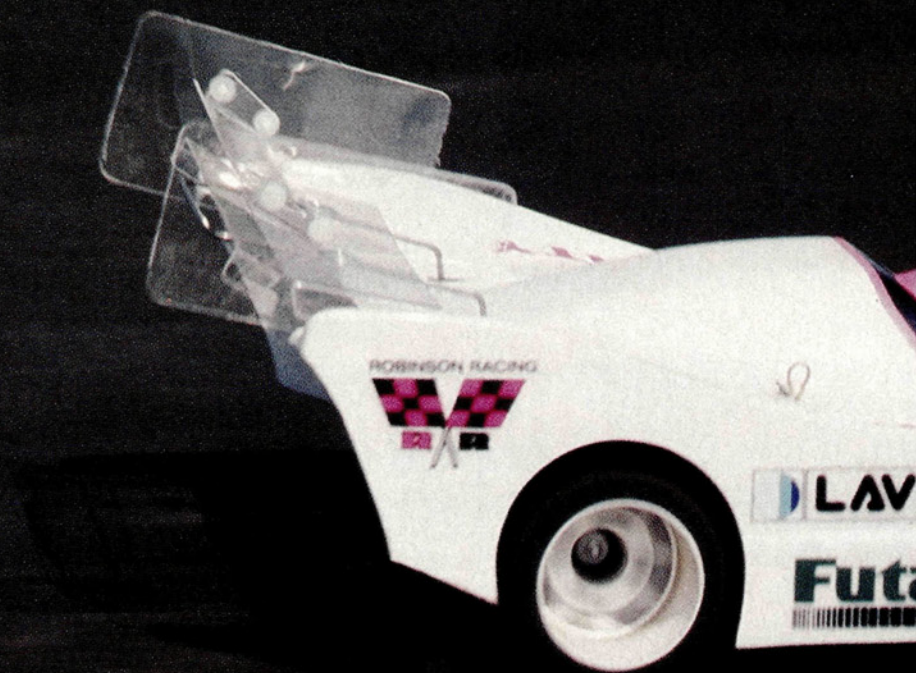


PHOTO BY STEVE POND

by STEVE POND

COMPOSITE CRAFT/TRC

LYNX

WEAPON: LYNX II ELITE
OBJECTIVE: ELIMINATE
ALL COMPETITION!

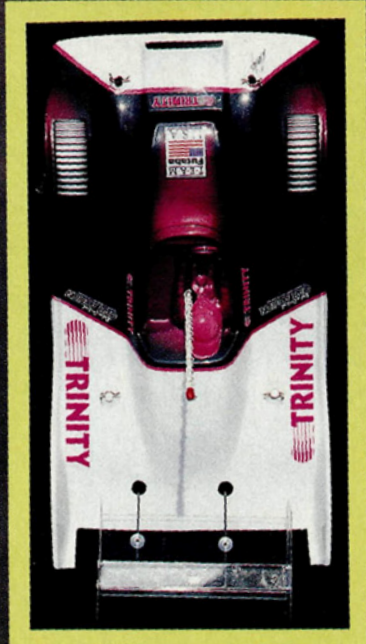
the car might look like other currently competitive machines, but the similarities between it and the others end at its flat chassis plate.

THE KIT

The Lynx II Elite has the beam front end that's found on many other $1/10$ -scale cars. One cinch block holds the beam to the graphite chassis plate and locks in the proper caster angle; and a carrier block on the other side of the chassis holds that side of the axle in place. Sound familiar so far? This setup sounds identical to that used on other cars, but it isn't. The Lynx uses a $3/8$ -inch front beam instead of the standard $1/4$ -inch, which bends easily (it was originally used on $1/12$ -scale cars). The larger, stronger axle doesn't weigh more because magnesium, not aluminum, was used in its construction.

At either end of the axle are larger-than-average kingpins—double the standard diameter. These are also designed to withstand the rigors of $1/10$ -scale racing. Their size helps to prevent the pins from bending, but if you do bend one, they're easily replaced. They aren't just pressed in, but are held by a setscrew at each end of the axle.

The Lynx chassis shows the usual Composite



NOT SINCE THE introduction of the ball differential or the T-plate suspension has anything rocked the high-performance, on-road racing industry as much as the Lynx II Elite. In an effort to make the Lynx the most advanced $1/10$ -scale pan car on the market, two manufacturing giants—Composite Craft* and Total Racing Connection (TRC)*—have combined forces. At a glance,

COMPOSITE CRAFT/TRC LYNX II

Type On-road
Scale 1/10
Sug. Retail Price \$299.95

DIMENSIONS:

Overall Length 17.5 inches
Width 9.125 inches
Height 7 inches
Wheelbase 10.25 inches
Front Track 7.5 inches
Rear Track 7.75 inches

WEIGHT:

Gross (w/bat.) 43 ounces

BODY:

Type Not included

CHASSIS:

Type Pan
Material Graphite

DRIVE TRAIN:

Primary Pinion/spur
Transmission Direct-drive
Differential Ball
Bearings Ball bearings

SUSPENSION:

Front: Type Large diameter crossbar
Dampening Coil-spring
Rear: Type Single A-arm with roll bar and rocker ball
Dampening Oil-filled coil-over shock

WHEELS:

Front: Type Nylon
Dimensions (DxW) 1.7x1 inches
Rear: Type Nylon
Dimensions (DxW) 1.7x2 inches

TIRES:

Front/Rear Foam

ELECTRICS:

Motor 540/05*
Battery 6-cell saddle pack*
Speed Controller Electronic*
* not included

OPTIONS AS TESTED:

Andy's TOJ body, Tecnacraft Titanium Ti-rods, Tekin 310 ESC, Futaba 2PBKA with FP-132S servo, Trinity Joel Johnson Modified Motor, Magic Motorsports Matched SCEs, Bud's Large Bi-Level Wing, Robinson machined stainless-steel pinion gears, Kimbrough Servo Saver

COMMENTS:

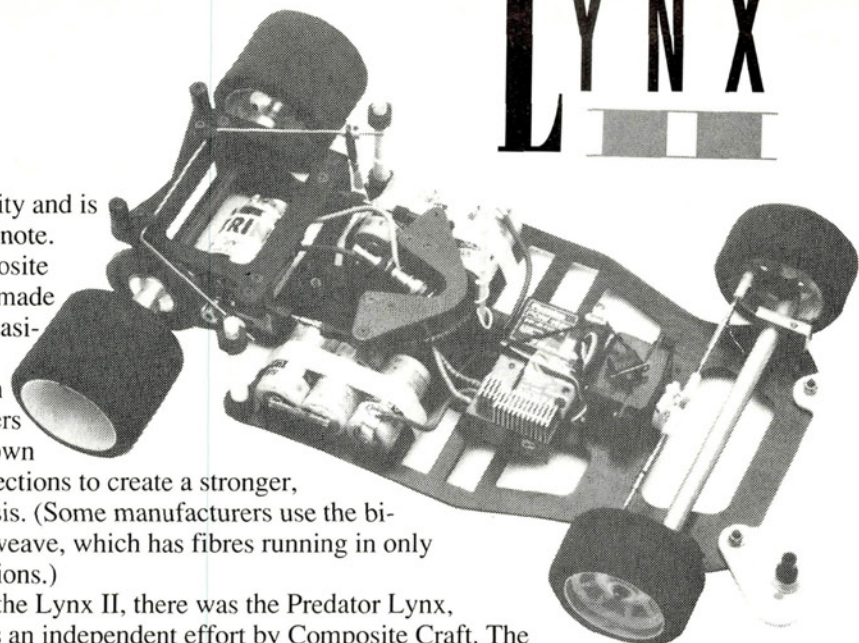
The Lynx II Elite is easy to assemble. It has a few minor flaws (see text), but this is the car to have. It's very versatile, and has a much better performance potential than the stock version.

LYNX

Craft quality and is worthy of note.

The composite chassis is made with a "quasi-isotropic weave," in which fibers are laid down in five directions to create a stronger, light chassis. (Some manufacturers use the bi-isotropic weave, which has fibres running in only two directions.)

Before the Lynx II, there was the Predator Lynx, which was an independent effort by Composite Craft. The new Lynx has many of the features of the original, e.g., the floating pod, which, unlike the T-plate suspension, was designed to move vertically without pivoting forward when the suspension is compressed. This design was very successful, but the five linkage rods that kept the pod in line with the chassis needed constant attention, or the handling would "disappear" faster than you were able to dial it in.



GAINING INDEPENDENCE

What's the most significant modification you can make to a pan car?—make the rear suspension independent. While trying to do that, the Composite Craft crew came up with an easy method: they made the rear pod independent of the chassis. What will this do, and how is it done?

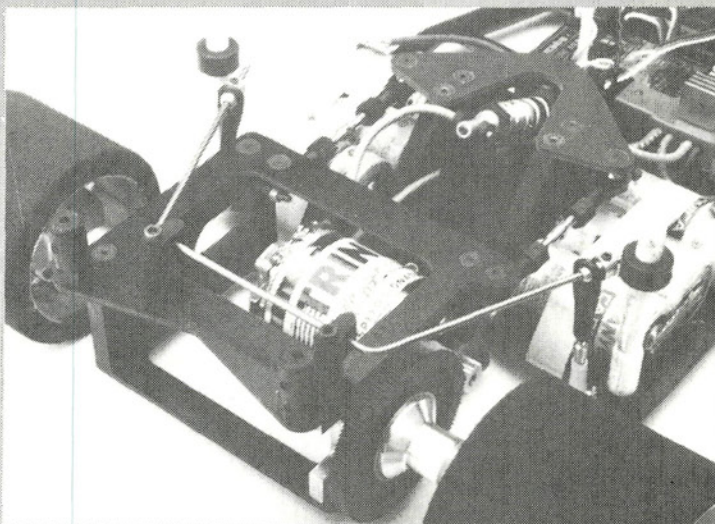
Well, by not relying on the flexing of a piece of fiberglass or graphite for dampening, this new system makes the rear suspension totally predictable. Dampening is handled by an oil-filled shock that's connected to an A-arm by way of two molded uprights. The A-arm lies flat and is connected to the pod at its apex where it pivots on a rocker ball. The A-arm uprights tilt forward and compress the shock during travel.

The pod's sideways motion is dampened by an anti-roll bar that's attached to the pod's rear and the chassis' trailing edges. Two adjustable rods join the

top front of the pod to the top of the shock mount. Are you confused? It's really a very simple, effective system.

Use of this system makes the rear pod incredibly smooth throughout its travel. Since it's attached to the chassis by a rocker ball, two control rods, and the roll bar instead of a T-plate, the pod stays level throughout its vertical motion.

Will this suspension configuration make the T-plate design obsolete? It's difficult to predict, but I can't imagine too many manufacturers sticking with it when they see the capabilities of the newer system.



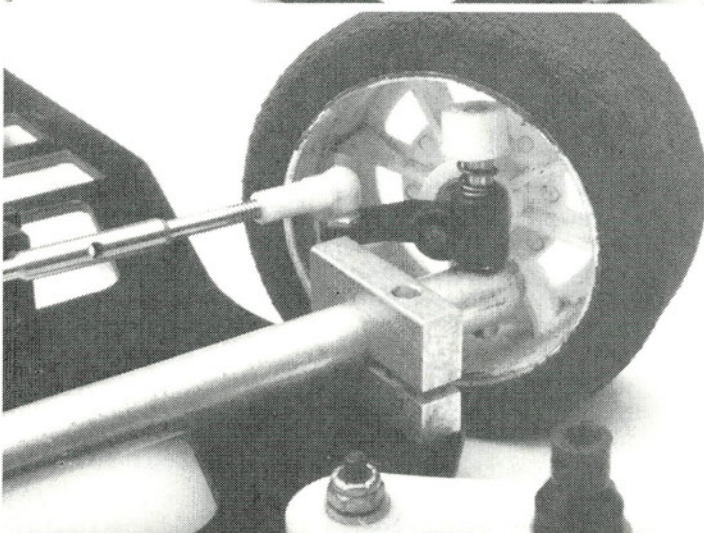
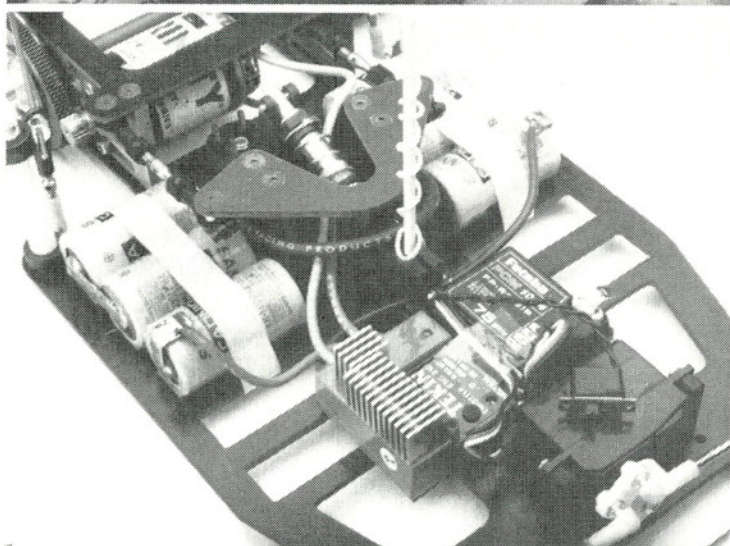
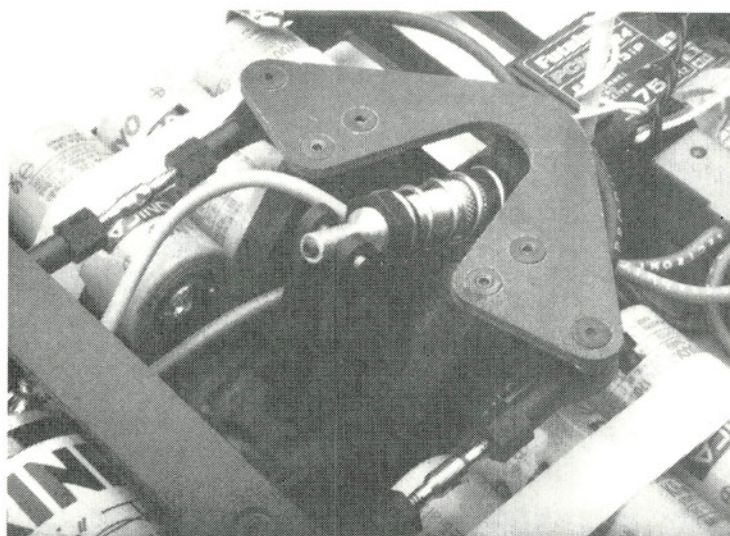
LYNX

The new Lynx II pod operates in a similar way, but with only two linkage rods. It has a fixed suspension "arm" to which the bottom of the pod is fastened, and two upper links keep the pod aligned. This allows the same freedom

of movement, but there are only two rods to be adjusted instead of five. To put the motor on the chassis center line, the pod has also been moved to the left. With the motor sitting at dead center, pod movement is much more consistent.

The pod's right side includes a strong, light, aluminum motor-mounting plate that's a good heat sink when the motor temperature reaches triple digits. An anti-roll bar keeps the pod's lateral movement in check, and it's also used to set the tweak.

The Lynx II axle is the standard graphite/aluminum unit with five ride-height adjustments. The kit also in-



“When other cars skip around bumpy turns, the Lynx soaks them up...”

cludes a complete set of ball bearings for the front wheels, the real axle and the pro diff, and a set of body mounts that can be used with a stock-car body (not included).

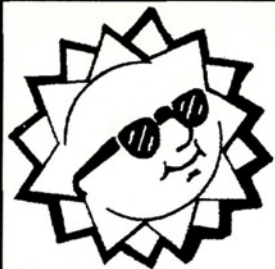
ASSEMBLY

Assembling the Lynx II is about as easy as assembling any other 1/10-scale on-road car, and compared with off-road cars, there are relatively few parts. You'll get no points for assembling the car quickly; the more time you take to ensure that every component is working properly, the faster you'll be on the track.

The instructions are like those that were once included with the RC10: a well-written instruction book and one with photographs. The two will get you through the assembly without a hitch, but they should have been combined. This is a minor inconvenience, but it would have been more helpful to have the pictures right above the writ-

(Continued on page 126)

Left (from top to bottom): ■ Included in the kit is a Delta pressurized shock, which is tough to set up, but does an adequate job of dampening. Note the adjustable upper links for fine-tuning the rear end. ■ A Tekin ESC 310 and a Futaba PCM 1024 make an awesome electronics package, while Magic Motorsports matched SCEs provide the power. ■ Extra-heavy kingpins are designed to take the punishment of 1/10-scale racing. Note the Tecnacraft titanium linkage.



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CESA BOAT

(Continued from page 106)

was actually a blessing in disguise, as it gave me the perfect excuse to install an electronic speed controller—the Turbo Zeta from PDI*—and a few extra cells. The ultimate in high-voltage proportional speed controllers, the Turbo Zeta can handle up to 32 cells (although I opted for a conservative 12). The Zeta's housing is machined aluminum, which not only acts as an excellent heat sink, but is also watertight.

To give the Cesa some breathing room, I headed to the open sea. I can tell you that, with 12 cells, this is a whole new boat, but you really have to see for yourself! There's still some cavitation, but it only lasts for a second as the extra horsepower launches the boat out of the water. The speeds are about as fast as you'd want a recreational boat to go, but if you have a warped mind, I'm sure there's still room for expansion!

Because of its size, the boat lends itself to high-speed running, as it can take some of the bigger waves without disastrous results. I did manage to make the boat spin

(Continued on page 125)

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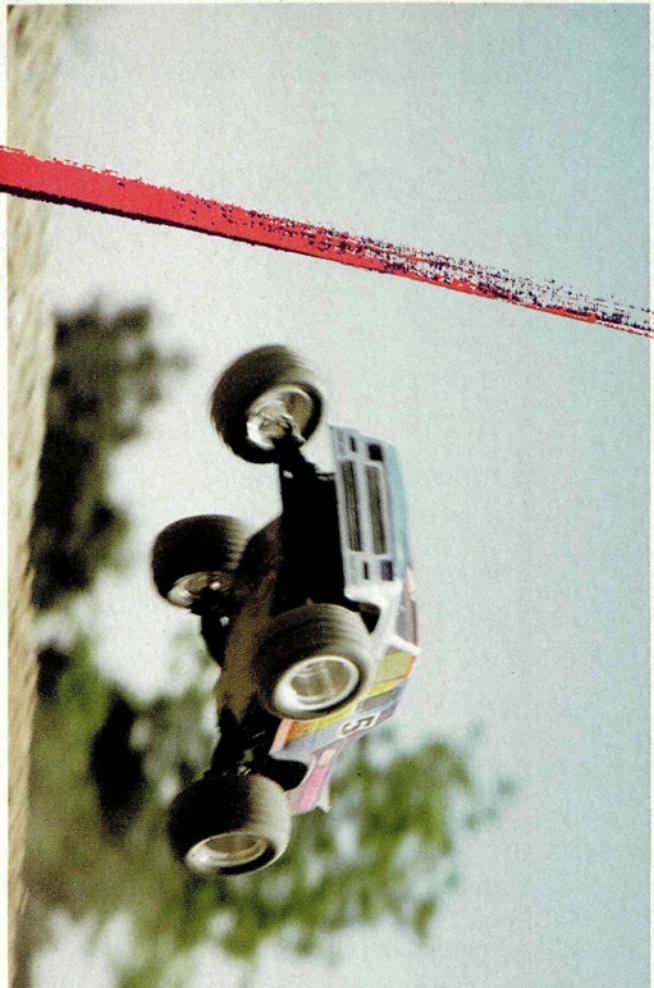


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JR-X2

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JR-X2 CONVERSION

by RICK HOULE

THE TEAM LOSI* JR-XT is unquestionably one of the finest 1/10-scale off-road racing trucks, and most sensible people don't waste their time trying to improve on perfection. I've never been accused of being sensible, however, and I couldn't resist wondering "What if...?" as I contemplated ways to improve my JR-XT.

Before that, the only after-market "go-fast goody" I had felt compelled to install was a Team Pit Stop* slipper clutch—not to improve performance, but to protect the tranny's innards. Rather than try to make the JR-XT better, I decided to build a completely new version using readily available products.

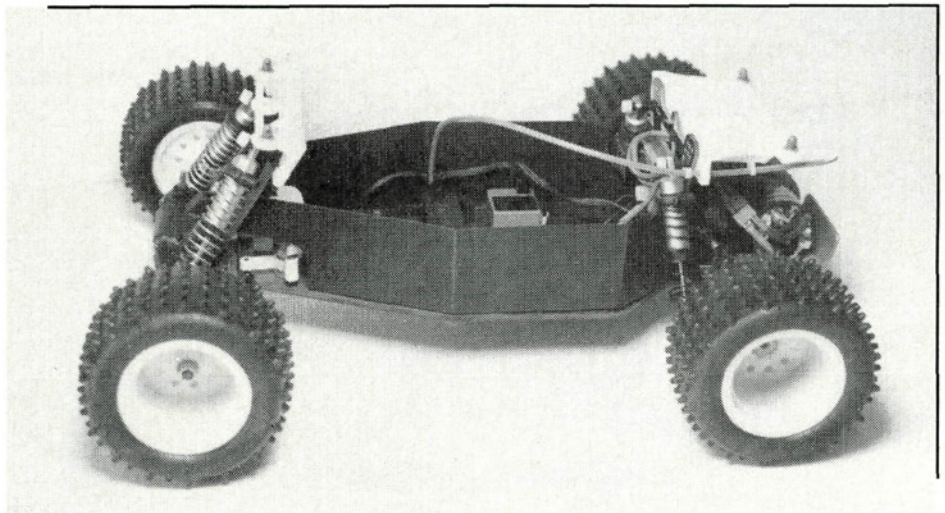
FALSE START

I started to build a JR-X2 Pro model from the myriad spare parts I'd accumulated to keep my JR-XT on the track (many are similar to those in the Pro Kit), and I planned to race it in the 2WD Stock and Open classes. The lure of monster-truck racing was too

much for me to resist, however; I scrapped the original plan halfway through, in favor of building a hybrid racing truck.

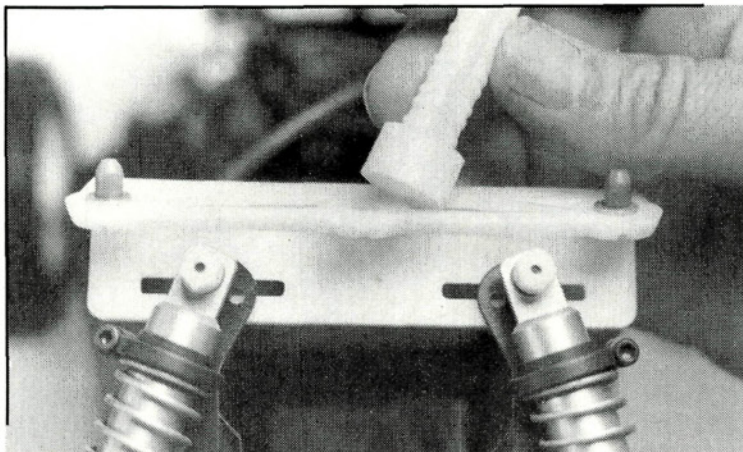
It occurred to me that this new truck would be an ideal test-bed for any after-market goodies I might use on the JR-XT, and I was particularly curious about the performance characteristics of the Losi H-arm rear suspension.

Although many companies sell conversion parts, Pro-Line* is one of only two that offer a *complete* conversion kit, i.e., one that has all the components needed to convert an already built JR-X2 off-road buggy into a race-ready truck. The Pro-Line kit includes a body with all the necessary mounts, four truck wheels and

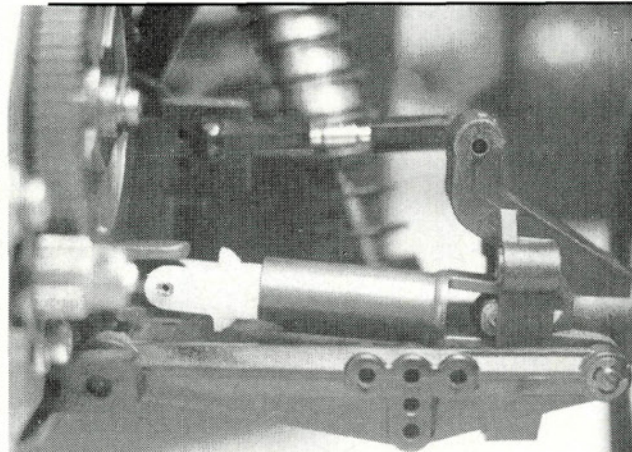


PARTS LIST

Pro-Line JR-X2 conversion kit	4001
Losi JR-X2 Pro chassis	A-4040
A&L front shock towers	2053
Losi Pro rear shock towers	TLA-2020
Losi long shocks	A-5001
Losi H-arms	2014
Brake-A-Way aluminum spindle carriers	N/A
RPM spindles	7310
Tecnacraft titanium Ti-Rods	16-06T
Losi super-slide universal sets	A3019
A&L JR-X2 steering bellcrank	3080
RPM battery carrier	7050
Boca Ultra Seal bearings	57-050S
A&L body posts	1005
D&E aluminum front wheels	5000
D&E aluminum rear wheels	5100
JG Mfg. front axle	1806
Track Master liquid mask	1515
Dahm's gray window tint	D810
Dahm's blue window tint	D811
Venture Racing Body Trim	VHL1050
Paragon Slip-Stream	55021
Pro-Line shadow & wing detailing kit	4517
Losi toe-in & anti-squat kit	A-2016

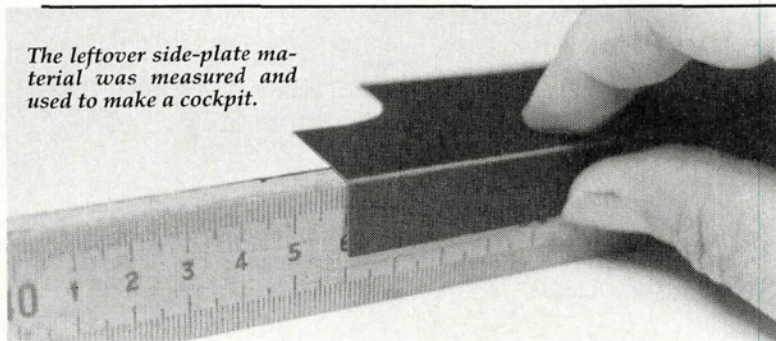


A&L front shock towers are slotted for infinite adjustment possibilities. For a more flush look, 1/4-inch-high A&L body posts were used instead of the stock ones.



Losi H-arms and Super Slider shafts are used at the rear.

The leftover side-plate material was measured and used to make a cockpit.



tires, and all the hardware needed to attach them to the chassis (e.g., axles, wheel adapters, etc.). It also includes extended front axles to accommodate the larger front wheels.

BACK TO THE STARTING LINE

Let me back-track to bring you up to speed. I started with a Team Losi JR-X2 Pro chassis, which is 1/2 inch longer than stock and has a 30-degree kick-up where the front suspension is mounted (instead of the stock 20 degrees), and I bolted on a stock JR-X2 tranny. I used stock Losi bulkheads to hold up A&L* front shock towers and Losi Pro rear shock towers. (The latter are better suited to the H-arm setup because of their extra shock-mounting holes.)

I mounted a long Losi shock on all four corners—attached to stock JR-X2 A-arms on the front and Losi H-arms on the rear. I attached hand-machined aluminum spindle carriers from Brake-A-Way to the front A-arms to carry RPM* spindles (with the Pro-Line extended front axles installed). To keep the critical suspension geometry adjusted to the proper settings, I used Tecnacraft* titanium turnbuckle control links (or "Ti-Rods") that were designed specifically for the JR-XT truck.

The busy minds at Team Losi figured out that two objects rubbing against each other create less friction if they're made of different materials, so they recently began to sell white, "super-slide," molded universal sets to be used with the standard dark-gray JR-X2 universal slide shafts. The set includes two male and two female shafts to be paired with the gray ones. Although it doesn't

matter how you match them, Losi recommends that you install the white shafts inboard.

Directional control for this land missile is maintained by an A&L* JR-X2 steering bellcrank with 1/4x3/8 inch bearings (the RC10 rear hub carrier-type). An RPM battery carrier holds the 6- or 7-cell battery packs. This carrier is slightly wider than stock, and its quick-access lid doesn't have the usual breakable plastic hinge.

Most of the other plastic parts and hardware needed to complete the rolling chassis are high-quality Losi components. Notable exceptions are the Boca* Ultra Seal bearings, which provide the most friction-free drivetrain operation. Although you must take great care when installing these (so that you don't damage the sensitive dirt seals), they require little or no maintenance and are lubricated for life.

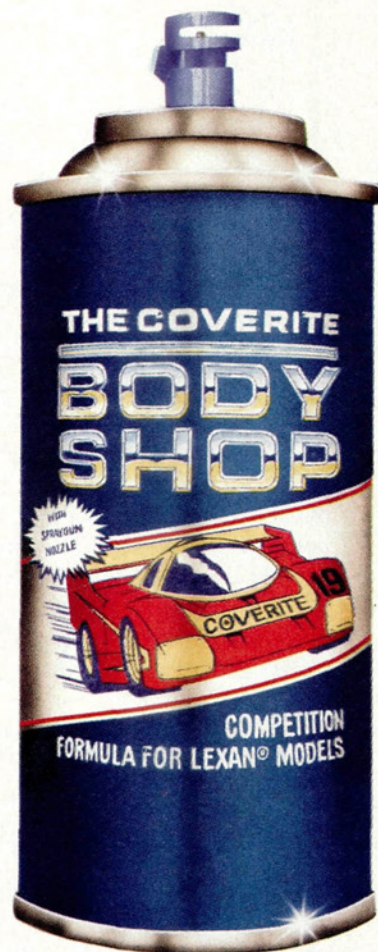
A Twister* powerplant with a 17- or 19-wind for 7-cell operation provides all the ponies required to blast the competition. For Ultra Stock forays, try a Pocket Rocket* stock motor. As the "heart" and "mind" for this "assault weapon," I chose a Novak* T-1 speed controller and an NER-2x receiver with an Airtronics* transmitter and steering servo.

GATHERING STEAM

The rolling chassis is now ready for the Pro-Line transformation, which begins with the front axles. If you own an already-built JR-X2, you'll have to remove both front axles from the steering spindles. Place one spindle in a vice that's opened only wide enough to allow the shaft to lie

(Continued on page 120)

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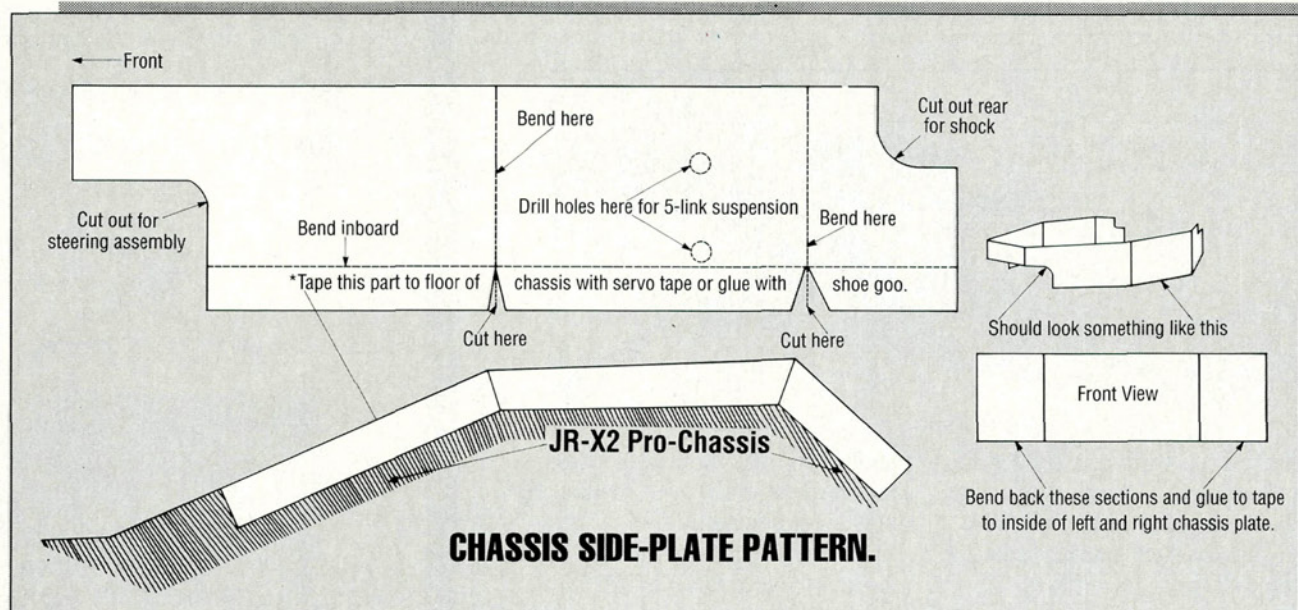
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loosely between its jaws, tap out the axle using a hammer and a short brass or aluminum rod, and install a longer Pro-Line axle. Be sure that the spindle-shaft holes on the axles line up with the holes in the spindles themselves. I simply pressed the Pro-Line axles into a pair of RPM spindles.

The second step is the assembly of the body mounts and posts. So that the shocks can accept the white mounting brackets, remove the 4-40x1³/₈-inch socket-head screws that hold the top shock mounts on the towers. (Screw the body posts onto the brackets before you mount them.) The kit contains four posts, which must be cut to length. When you've determined the proper height for the body, simply cut them above the correct rib and snap them into the post bases, which are then screwed onto the brackets.

The plastic bases that hold the posts are ³/₈ inch high; I wanted to the body shell as low as possible, so I used four, very small, red A&L body posts instead. These are only ¹/₄ inch tall and approximately 5mm wide, so you can mount the shell nearly flush with the tops of the mounting brackets.

Attach the brackets to the shock towers with the 4-40x1³/₈-inch screws. The screw holes in the brackets are slotted to allow proper alignment, no matter where your top shock mounts are located on the towers.

The installation of Pro-Line's wheels and tires is next. My kit contained four Speed Paw tires; they fit easily onto the rims, and I secured them with CA. Remove the stock Losi bearings from the front wheels, and give all four JR-X2 wheels away to some needy novice driver; once you've experienced monster truck racing, you won't want to go back to buggies! Press the bearings into the Pro-Line wheels, and install them onto the front shafts. The rear wheels bolt right onto the stock JR-X2 axles, so you don't need longer axles or nut adapters.

Later, I switched to a set of D&E aluminum monster truck wheels that were designed for the JR-XT. The front wheels require the Tamiya 5x11mm bearing and a 5mmx³/₄-inch axle (such as JG Manufacturing's* part no. 1806), but D&E's designers might discontinue this item and offer a direct bolt-on front wheel for stock JR-X2 axles. (The rear D&E wheels are direct bolt-ons.) With the wheels and body mounts in place, you're 90 percent ready to head to the racetrack!

THE HOME STRETCH

After thoroughly washing and drying the Toyota Extra Cab body shell, I applied a thick coat of Track Master* liquid mask to the inside and allowed it to dry. When I had applied all the Pactra* colors, I used Dahm's* smoke-gray window tint on the rear and side windows and to

create a tinted front-window visor. For Concours events, I fashioned a bug shield from scrap polycarbonate, and I tinted it with Dahm's sky-blue window tint.

I finished the entire edge of the body shell with a great new product from Venture Racing*. Made of a flexible ABS plastic, Body Trim resembles a grooved cord that's glued all around the shell's edge, across bumpers, around wheel wells, etc. It's available in 10 colors (four are neon).

Devcon* Super Glue is ideal for attaching this trim. Uncoil the 5-foot length of Body Trim, and carefully press the middle onto the center of the truck's front bumper. When you have the trim exactly where you want it, apply a drop of glue. Gluing a short section at a time, work backward along both sides of the truck until the ends of the trim meet in the center of the rear bumper. Body Trim is excellent for reinforcing the shell's edge to protect it from cracking, and to prevent its rough edges from cutting tires (especially foam ones).

After you've finished the entire body and put on the decals, apply a liberal coat of Paragon* Slip-Stream to the outside, and buff it to a mirror-like shine.

The conversion wouldn't be complete without the Pro-Line shadow and wing detailing kit, which contains two 5x10-inch sheets of very thin ABS plastic and a 4x8-inch sheet

(Continued on page 148)

CESA BOAT

(Continued from page 114)

out several times during cornering, but this was deliberate. This would have spelled disaster for other boats, as water washed over the transom, but the Cesa only got a little wet on the outside, and no harm was done to the radio gear.

A BETTER BOAT?

If you want to compete with the Cesa, you'll have to modify the drive system somehow because during tight turns, the dogbone coupler exhibits substantial drag, which will sap a lot of your speed. I also found that with the extra 6 cells, there's a need for a better wiring system. The dove-tail connectors that are included in the kit proved to be the weak link when drawing high amperage. They started to arc, and this generated enough heat to melt the wire insulation. At the very least, the connectors should be soldered to the motor tabs, if not clipped off altogether.

Water-cooling for the motors wouldn't be a bad idea either; in fact, some mild modifieds with bearings might be wise choices. If you choose to water-cool, there's a water pickup on the outdrive for

use with the gas-powered engine. All you have to do is hook it up to your electric motors with one of the many cooling add-ons that are available.

With the exception of a few problems, the Cesa will fit the bill for boating enthusiasts across the spectrum. Wild or mild, this boat has what it takes!

**Here are the addresses of the companies mentioned in this article:*

Hobby Dynamics, 4105 Fieldstone, Champaign, IL 61821.

Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718.

PDI, 16922 N E 124th St., Redmond, WA 98052. ■

COUNTED OUT

(Continued from page 85)

antenna incorrectly and usually results in missed laps, or even no count at all.

CHECK THE CHECKLIST

Use this checklist to double-check your transponder mounting position and method.

1. Mount the transponder as far away from motors, batteries, speed controllers, high-current wire and servos as possible.
2. Mount the transponder with the mount-

ing post vertical, not in the windshield or a side window where it would be mounted at an angle.

3. Make sure the mounting hole is a tight fit for the 1/4-inch mounting post.

4. Put a thick plastic washer between the mounting clip and the transponder to ensure that the transponder is held tightly in position.

5. Solder three 0.01-microfarad cap-type capacitors to your motor—one from each terminal to the motor can and one between the two terminals. If you have counting problems with this arrangement, put a 47-microfarad can-type capacitor between the motor terminals. In the case of extreme interference, even more capacitors might be necessary. (This usually occurs when older versions of the AMB counting system are used with the new, motor-management, high-frequency speed controllers.)

6. If you mount the transponder on a graphite chassis, make sure the mounting arrangement is completely insulated from the chassis. Graphite is an excellent conductor of electricity, and improperly installed batteries, etc., can cause problems.

If, in spite of all these precautions, your

(Continued on page 126)

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GRAPHITE ATTACK

When you're out on the track, bashing head-to-head with some serious competition, you've got to have the right equipment in order to win. The new TRX-T Eagle was designed by championship racers, and from the start, has been outfitted with all the lightweight hardware and premium racing accessories you need. For instance, each Eagle graphite chassis is individually molded and sealed. The precision ball differential uses all heavy-duty components and can be externally adjusted in seconds, right on the starting line. The driveline is smooth and efficient with all 48-pitch gears and splined telescoping driveshafts. Ball bearings and turnbuckles are used throughout the truck.

Eagle's suspension geometry has been carefully calculated for responsive steering and zero bump deflection. New longer suspension arms, special axle carriers, and new lightweight offset wheels give Eagle the widest possible race stance for superior stability and handling. Long-body T-6 aluminum racing shocks are used front and rear to provide over 2 inches of suspension travel.

Even before TRX-T Eagle's release, pre-production samples in the hands of Team driver Mike Hamilton, won the Roar Region IV Championship, top qualified at the N.O.R.R.C.A. Midwest Regionals, and won the Trophy Dash! If you're serious about your racing, and even more serious about winning, the TRX-T Eagle is for you.



SPECIFICATIONS	
TYPE	2WD off-road
CHASSIS	Graphite Composite
SHOCK TOWERS	Graphite Composite
SUSPENSION	Fully independent; upper and lower control links
DAMPENING	High-volume, oil-filled, coil-over, T-6 aluminum long case
WEIGHT	45 oz. (less elec.)
WHEELBASE	280mm
LENGTH	460mm
TRACK WIDTH	311mm
HEIGHT	205mm
GEARS	48-pitch
FINAL DRIVE	4.03:1
DIFFERENTIAL	Adjustable ball type

TRAXXAS

12150 Shiloh Rd. Dallas, TX 75228

COUNTED OUT

(Continued from page 125)

car still has counting difficulties, the problem might be with the AMB system used. Promptly bring any suspected counting discrepancies to the attention of the official scorer. You'll usually have two heats after the results have been posted during which you can report possible counting problems.

By the way, Joe Hotshoe corrected his car's setup and counted flawlessly during the rest of the championship. As luck would have it, Joe had an even more fabulous drive in the third qualifier and ended up winning the R-Main.

Editor's note: Don Holub operates his own computer consulting firm. He has served as official scorer at numerous national R/C car racing events, and he developed and marketed the ProScore race-management software used to score all ROAR National races.

*Here's the address of the company mentioned in this article:

Bolink R/C Cars Inc., 420 Hosea Rd., Lawrenceville, GA 30245.

LYNX II

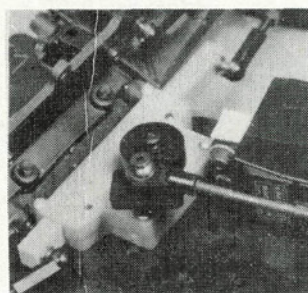
(Continued from page 112)

ten instructions (call me picky).

The instructions list the required tools and supplies and a few "optional" items, e.g., 8-32 and 4-40 taps for cutting threads in some of the parts that have to be screwed together. In my view, these items are necessities rather than options. Even the plastic parts are reinforced with graphite, and it's difficult to put a screw into them. Cutting threads on the screws makes the assembly easier, and it relieves some of the stress that's created when you try to force a thread into the material with a machine screw.

Did I encounter any problems during assembly? Not really, but I do have one minor gripe: the stock aluminum steering turnbuckles are 1/4 inch too long! The instructions don't tell you to shorten each side 1/8 inch to make them fit. I'm sure that when the manufacturer has exhausted all supplies of these linkage rods, they will be replaced with those of the correct length, but right now, it's a pain. There's also a clearance problem on the front end where there are holes through which you mount the axle for a longer or shorter wheelbase. With the axle mounted for the longer wheelbase, the tires scrub the chas-

(Continued on page 138)



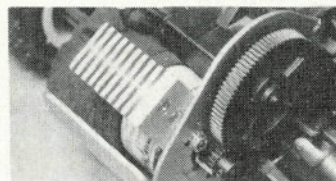
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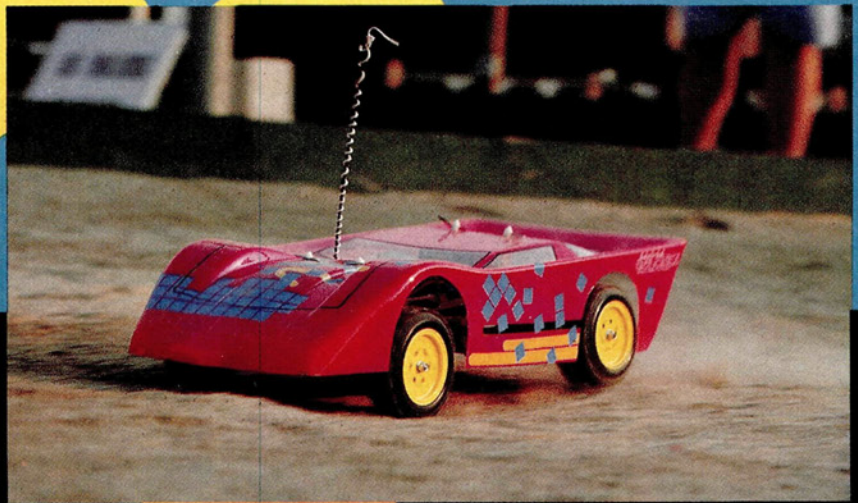
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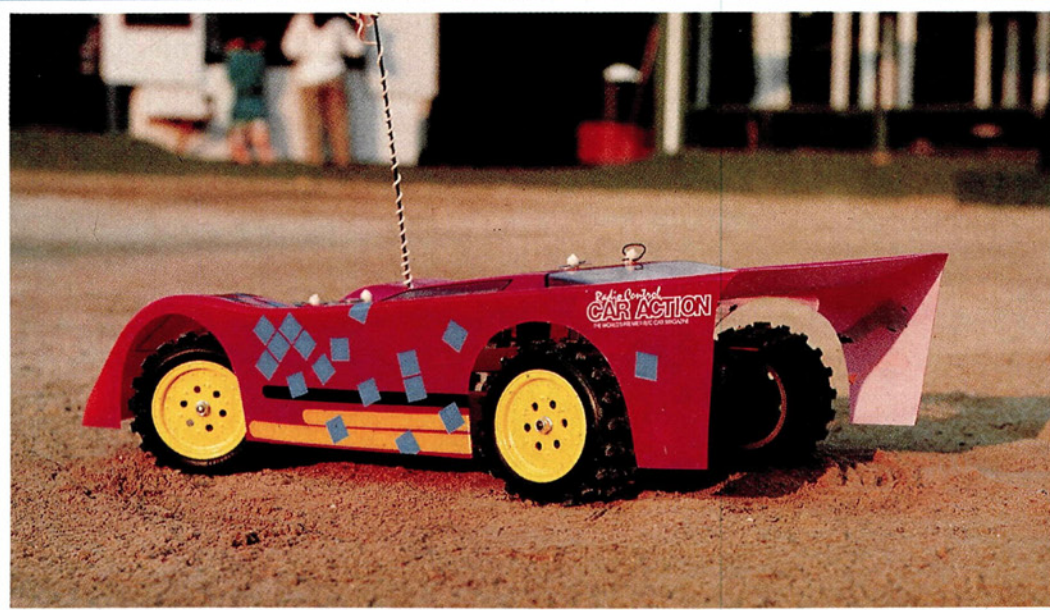
PHOTOS BY STEVE POND

SINCE REVIEWING the Tamiya* Super Sabre, I've enjoyed hours of racing, and, apart from its electronic speed controller, the car has remained totally stock...until now! When I took on this project, I was skeptical about changing an already excellent racing design, but I changed my mind when I received the new Sassy Chassis* aluminum-chassis kit. Without the stock ABS-plastic tub, the new design is 5 ounces lighter; the car's vital parts are more accessible; and trackside adjustments are a dream!

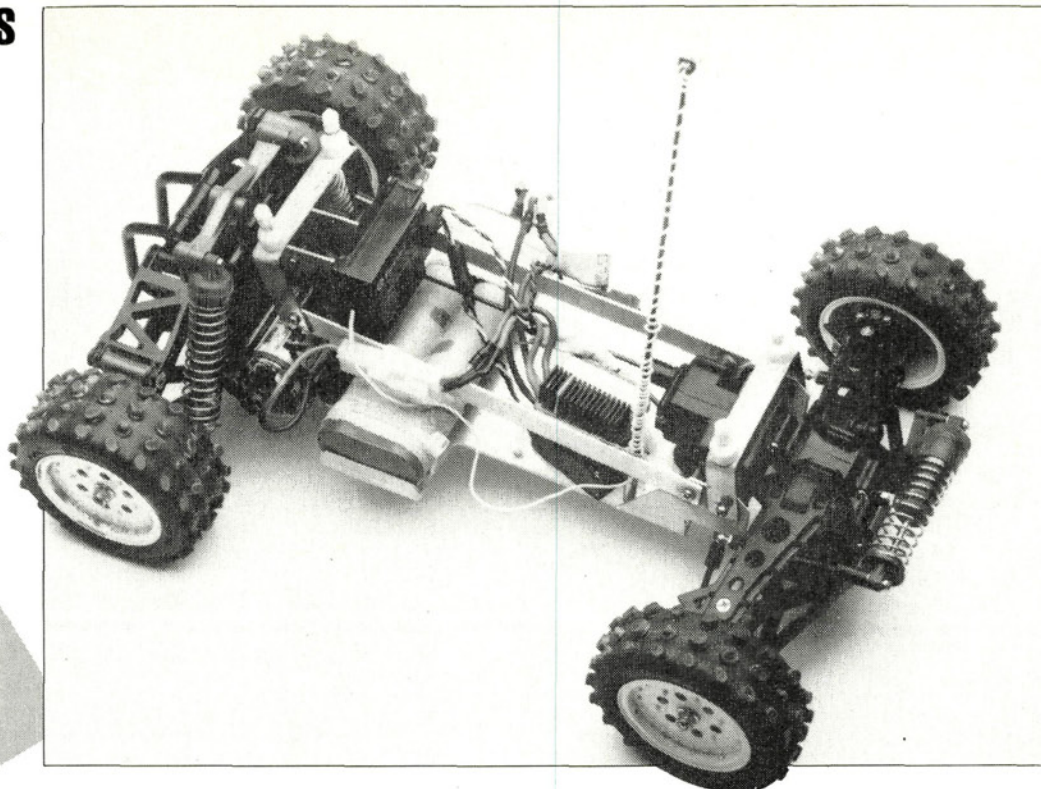


SASSY'S. TAMIYA 4WD ALUMINUM chassis

by JOE BRUNI



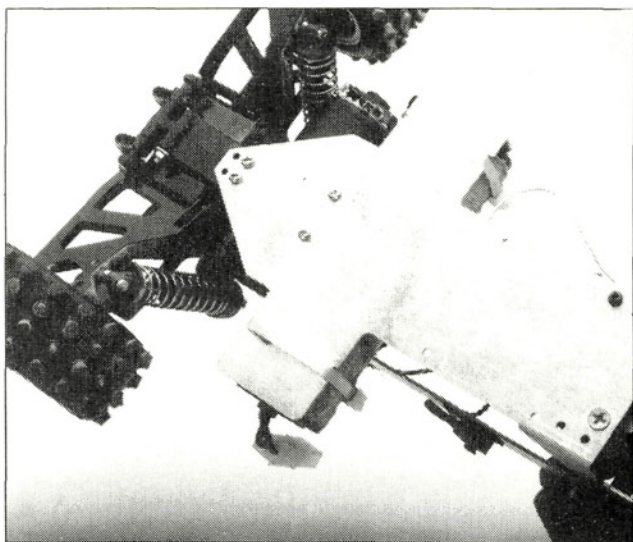
SASSY CHASSIS



THE KIT

The Sassy Chassis kit includes seven, light, yet durable, aircraft-aluminum pieces and an easy-to-follow instruction sheet with diagrams. It can be used on the Tamiya Super Shot, Boomerang, Hotshot I and II and Big Wig.

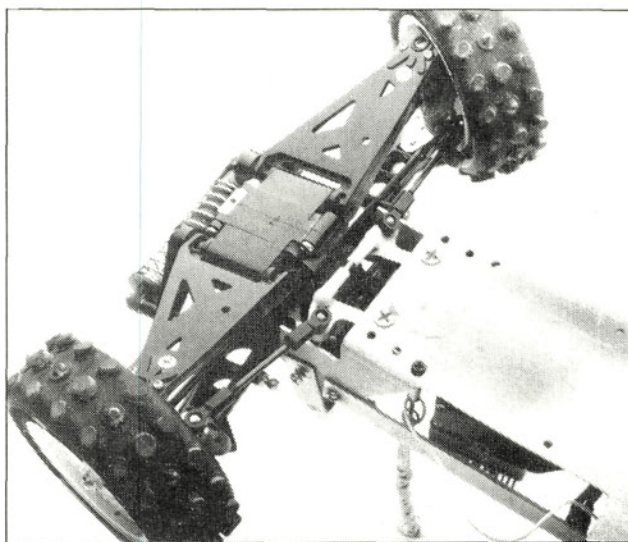
To fit the Super Sabre onto the new chassis, you have to remove both differential systems from the original tub. After the 12 screws have been taken out, the original chassis can be separated into four parts: the front and rear



All holes for mounting the front and rear diffs are pre-drilled in the aluminum mainframe.

The heart of this kit is the unique, one-piece, monocoque chassis plate that's specially designed to accommodate the front and rear diff and suspension assemblies.

To keep my Super Sabre as stock as possible, I chose not to use the included front and rear aluminum shock-tower plates, which allow the addition of good after-market shocks. The rear diff system also has a separate, aluminum, one-piece bracket that's designed to fit snugly on all the aforementioned cars. To reinforce the chassis, two aluminum side rails connect the front and rear diff assemblies.

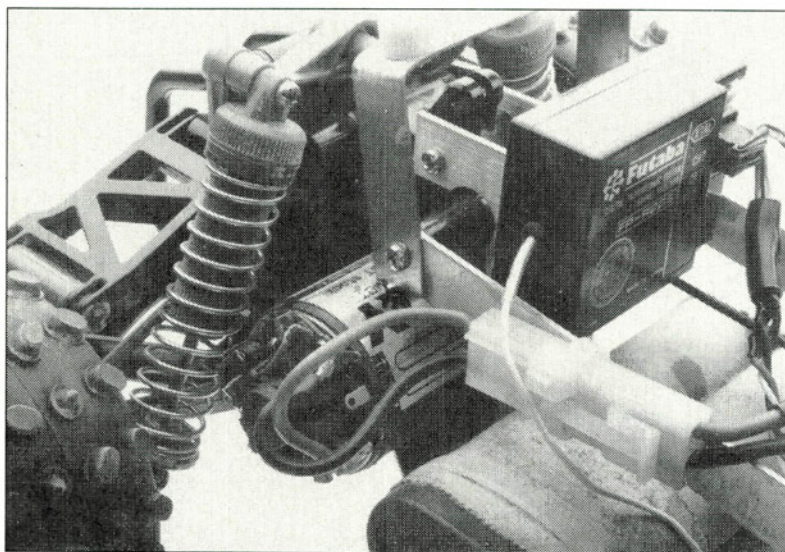


The kit doesn't include a steering assembly, but an optional bellcrank system is available and was used on the test car. (See text.)

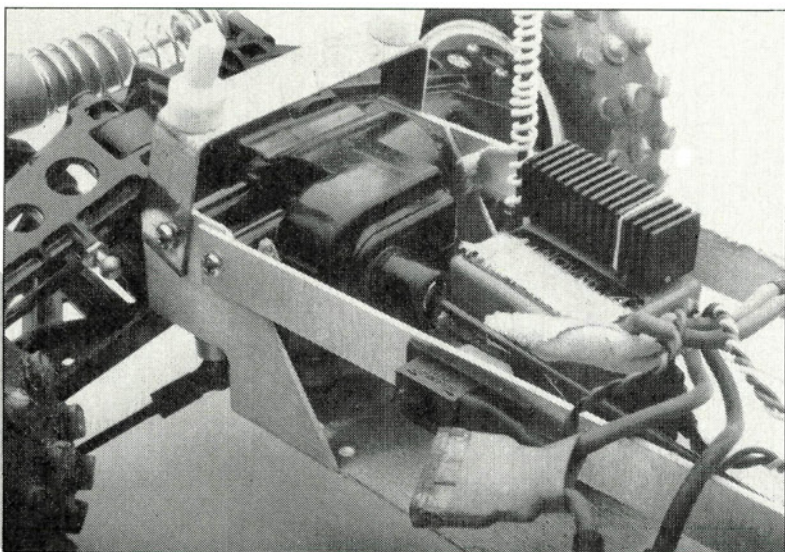
diff assemblies, the main chassis tub and the front bumper. The Sassy Chassis kit doesn't include a front steering mechanism, but an optional bellcrank steering system is available.

When the steering system is in place, install the front diff/tranny system using the original Sabre no. 12 screws. First, line up the front mounting holes on the chassis with those on the car, and tighten the two screws. Then attach the two side rails to the outside of the Sassy Chassis front mount.

To mount the rear bracket, you must remove the top screw and nut that join the transmission halves. Put the bracket into place, replace the screw, and tighten the nut. If the bracket included in your kit has an extra set of mounting holes below the top ones, don't use them, or you might cause diff-gear binding.



The screws that go through the aluminum body-mount supports also go through the upper chassis rails and into the rear diff case.



At the front, different screws are used for the aluminum body-mount cross-member and the upper chassis rails, but the screws for both go into the front diff case.

Turn the rear diff/tranny assembly upside-down, and find the two holes just below the motor-mounting screw (one on each tranny half). Loosen the engine-mounting and rear-tranny screws, slip part no. 10 (from parts tree E in the original Tamiya kit) into the holes, and re-tighten the screws.

Before you attach the rear diff/tranny to the main chassis plate, install the original steel shaft drive that con-

nects the front and rear drive systems. To mount the rear diff/tranny assembly, align part no. 10 with the two rear chassis-plate holes and secure it with no. 12 screws from the original kit. Slide two, 1/4-inch, 4/40 screws through the chassis plate and into the mounting holes on the rear bracket, and tighten.

To complete the assembly, attach the rear of the side rails to the rear tranny halves. Mount any standard-size steering servo in the holes provided and connect it to the Losi* steering mechanism. (I chose a Novak* electronic speed controller and a Pulsar EXP-2001 pistol-grip radio.)

To top off my rejuvenated 4WD off-roader, I chose a McAllister* Corvette wedge body. With the help of "master paint-and-detail man" Von Eric (Goldschrafe), I painted the car with Pactra* metallic red and detailed it with MonoKote* trim sheets. With Velcro to hold a standard six-cell pack in place, I headed to the track.

PERFORMANCE

Without hesitation, I floored the car right off the starting line, and it leaped forward, spraying dust and rocks from all four tires! The missing 5 ounces made a noticeable difference to the car's agility and top speed. The original Sabre exhibited excellent jumping capabilities, and the new Sassy Chassis conversion improves on that; it landed tail-first, spewing dirt roosters from the stock spikes! Remember that this car has only stock parts; imagine four racing shocks, a hot-wind motor and seven cells!

After running three full battery packs, I decided to check how well the car was withstanding the constant pounding. Two of the rear chassis screws were loose, but ol' dependable Loctite* 242 solved the problem.

If you're looking for an advanced, lighter, more durable racing chassis for your Tamiya car, Sassy Chassis' conversion kit is the ideal way to go!

*Here are the addresses of the companies mentioned in this article:

Tamiya/MRC, 200 Carter Dr., P.O. Box 267, Edison, NJ 08818.

Sassy Chassis, 204 S. Oak St., Itasca, IL 60143.

Team Losi, 1655 E. Mission Blvd., Pomona, CA 91766.

Novak Electronics, Inc., 128-C E. Dyer Rd., Santa Ana, CA 92707.

McAllister Racing, 2245 First St., Unit 105, Simi Valley CA 93065.

Pactra/Plasti Kote Co., 1000 Lake Rd., Medina, OH 44256.

MonoKote, distributed by Top Flite Models, 2635 S. Wabash Ave., Chicago, IL 60616.

Loctite Corp., 4450 Cranwood Ct., Cleveland, OH 44128.

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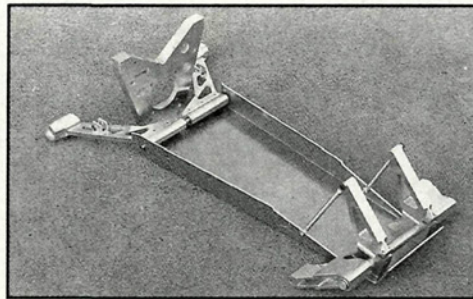
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LYNX II

(Continued from page 126)

sis in the turns. I had mounted the axle for the shorter wheelbase, so I had no problem, but if you prefer the longer wheelbase, be prepared to file the chassis.

To complete the kit, you need a body, a 2-channel radio, a motor, batteries, and a speed controller. I had seen the Lynx II's performance on an oval track, so I decided to go with an Andy's* TOJ body for roadcourse racing. The kit includes a set of green-dot foam tires, which are suitable for this type of racing, but I wanted tires that would last longer. I bought some TRC 1.7-inch wheels and mounted a number of sets with the Twinn-K* UFRA black-dot rubber. Because the rims were small, the 2-inch pre-trued foams wouldn't fit. My only alternatives were un-trued donuts, which are actually cut for 1/8-scale cars, so they're rather large. When all the dust (tire dust!) had settled, there was a large pile of foam, but the result was worth the effort. The tires will last much longer, and compared with those made of standard foam, they stick very well.

The Lynx uses the Futaba* Magnum Jr. radio with high-speed S132 servos. (They fit perfectly into the molded servo mounts included in the kit). For roadcourse racing, I chose a Trinity* Joel Johnson Modified Motor, which was designed for off-road use but works equally well on tight roadcourses. Trinity's Pushed SCE packs provide the power. They're rated according to capacity, so you know just what you're getting. To complete the package, I installed a Tekin* ESC310 speed controller. Tekin's latest version of its least expensive speed controller has the same features but includes torque control.

AT THE TRACK

My tests included numerous runs on asphalt, concrete and carpet (covers all bases?). It would be an understatement to say the car is competitive on carpet, because it was always in the thick of the competition, but this is where the Lynx had its best run for my money. Carpet tracks are usually considerably smoother than asphalt or concrete, and here, cars with inferior suspension can keep up with the Lynx, but on outdoor concrete and asphalt surfaces, the Lynx forges ahead. Outdoor surfaces are bumpier, and you'll

(Continued on page 146)

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Pro Radiant

SOUPIN' UP AYK's 4WD ASSAULT WEAPON

AYK/RACE PREP'S* Pro Radiant has been around for some time. This car has many innovative features, and it continues to be one of the most advanced 4WD cars on the market. In its latest version (reviewed in the June '89 issue of Car Action), the car is winning the respect of many local racers as well as those racing at the World's level.



PHOTOS BY BOB GAGNE

Mike Dunn drove his Pro Radiant to a 7th-place finish in the 4WD Class A-Main at the '89 IFMAR World Championships. This was quite an accomplishment for both driver and machine, as only four different makes of cars qualified for the A-Main out of all those manufactured worldwide. All the cars at that level of competition are "factory rides," but can the average, weekend, club racer get the kind of equipment that keeps the team drivers ahead of the competition? Recently, some of the "trick" parts have become available for other 4WD machines, but there are still some hold-outs who won't let go of the high-performance goodies. The AYK/Race Prep factory is one of the crews that makes all of its "go-world-class-fast" accessories and options available through regular retail hobby outlets. These aren't third-party hop-up parts, but real improvements that are born of tough national and

world competition. With these parts, anyone can build a car just like the one Mike Dunn drove in the World's 4WD A-Main.

The new optional parts include a saddle-pack graphite chassis, two sets of gold-plated Pro-2 electrical connectors, a set of soft-compound "block-pattern" tires, a steering-rack kit, a spur-gear adapter (which uses any standard spur gear with any pitch size), a rear sway bar, a set of high-performance bearings, an adjustable chain tensioner with ball bearings, a 14-turn double Race Prep motor, a 7-cell set of "TNT-matched" SCE batteries and the new Boost body with a wing and an under-tray.

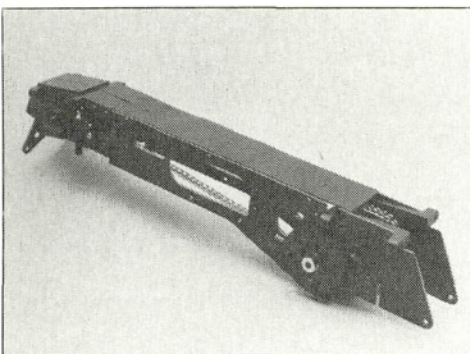
THE BASIC KIT

I had to assemble the basic Pro Radiant kit as it comes from the box so that I could compare the stock configuration with the modified car and its

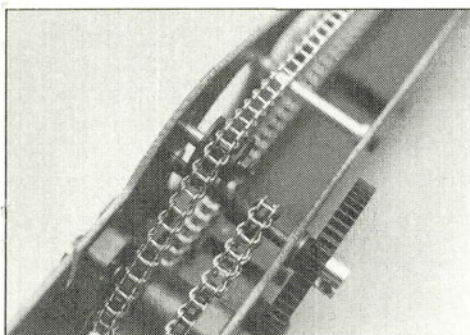
by BOB GAGNE

high-performance options. Fortunately, the instruction manual has to-scale parts drawings on each page. They're crude by Tamiya standards, but they work, and they made assembly much easier. There was no advice about using thread-locking compound on metal-to-metal fasteners, and this was disappointing. Anyone who has raced 4WD cars knows how important thread-lock is; without it, every screw seems to rattle loose during every race.

There was little, if any, logic in the way the parts were grouped. I had to open several bags for each assembly step, and although the bags were labeled, no reference to the parts-bag label was made any-



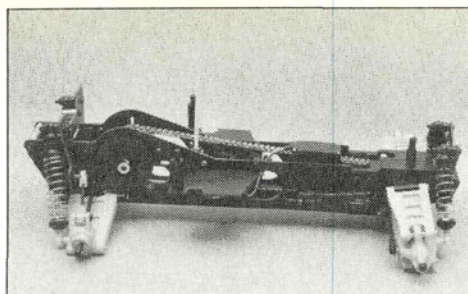
The underside view of the stock chassis shows that the chain drive has no dust covers to collect small stones and dirt. This eliminates some headaches and maintenance problems.



The stock chain-tensioning system leaves much to be desired. Shown here are the plastic pulley, brass bushing and nut-and-bolt mount. The pulley free-floats on the bushing.

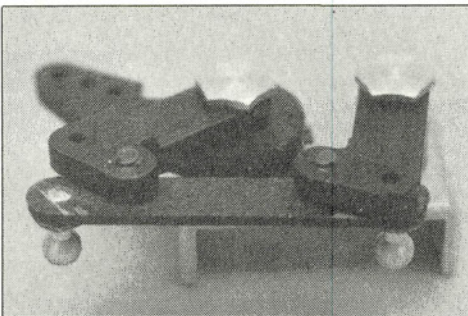
where in the instructions. Until I became familiar with the car's assembly, I had trouble finding some of the screws and nuts. The kit's strength lies in the simplicity of its design. The shocks, which are among the best in the industry, were a delight to assemble, and they rank right up there with Associated and Losi shocks. They work very smoothly, and they don't leak. The drive train consists of two chains and two ball-diff assemblies that each have two sets of sprockets (15-tooth on one end, 16 on the other) so that you can change the final drive ratio or the front/rear power transfer by reversing the two ball-diff assemblies—a neat idea; but again, it's not mentioned in the instruction manual.

The differentials work quite well, but their adjustment is critical. There's a thrust



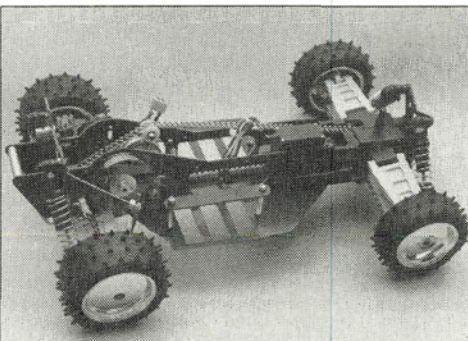
The stock chassis has a clean, simple design. The slot in the chassis side rail allows the battery pack to be mounted width-wise. It's held in place with battery clamps attached to the upper radio tray (shown with antenna mounted and body-mount posts). This placement gives a very high center of gravity.

bearing in the assembly that's very small and easily crushed. Follow the directions, and don't tighten the diffs until it's time for the final adjustment. Adjustments are made through the output cup on the right side of the front and rear diffs. This is a pain, because you must take down both sides of the suspension to adjust each diff. There's a locking screw in the left side of the diffs, and it must be tightened after you



The optional steering rack uses the stock servo-saver arms, but replaces the link with a graphite rack. Note the file marks: the shafts of the ball links are very long and must be filed flush to avoid catching on the servo-saver arms. CA helps to prevent them from loosening.

get the adjustment right. If you aren't careful about this locking screw, the diff will readjust itself as you run, and it will slip to the point of being disconnected. (I found this out the hard way.) Once set and locked, these diffs should stay where they're set, so you shouldn't have to go through this ordeal very often. A pleasant surprise were the heavy-duty bearings that support the output cups. With a minimum



The completed rolling chassis showing the seven-slot saddle-pack battery tray and holder on the graphite chassis. No radio gear has been installed yet, but it will be tight.

AYK/RACE PREP PRO RADIANT ORIGINAL KIT

Type 4WD off-road
Scale 1/10
Sug. Retail Price \$259.95

DIMENSIONS:

Overall Length 14 inches
Width 9.75 inches
Height (with wing) 5 inches
Wheelbase 10.25 inches
Track (f/r) 8 inches

WEIGHT:

Gross (w/battery) 3 pounds, 5 ounces

BODY:

Type Aerodynamic, off-road buggy
Material Polycarbonate

CHASSIS:

Type Monocoque box
Material Fiberglass

DRIVE TRAIN:

Type (primary/secondary) Pinion and spur/chain
Differential Ball
Bearings/Bushings ... Ball bearings, bronze and plastic bushings

SUSPENSION:

Front: Type Upper and lower A-arms
Dampening Oil-filled, coil-over shocks
Rear: Type Lower A-arm/upper control arm
Dampening Oil-filled, coil-over shocks

WHEELS:

Type (f/r) Plastic, one-piece
Dimensions (DxW) (f/r) 2x1 inches

TIRES:

Front/Rear Low-profile, pin-spoke

ELECTRICS:

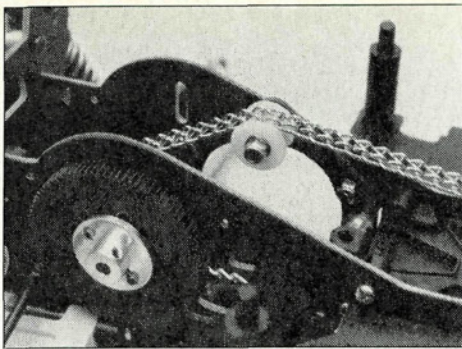
Motor not included
Battery not included
Speed Controller not included

OPTIONS AS TESTED:

High-performance bearing set; Race Prep 14-turn, machine-wound motor; Sanyo SCE, 7-cell, 8.4V battery pack, Novak T-1 speed controller.

COMMENTS:

The Pro Radiant handled well, with only a few problems that are common in 4WD buggies. There still isn't much room for the radio gear, but a micro component or two should get you onto the track in no time. The Pro Radiant uses the same chain-drive system that has been replaced in other 4WD cars, but it's very efficient, and with a little extra attention, it shouldn't be a problem.

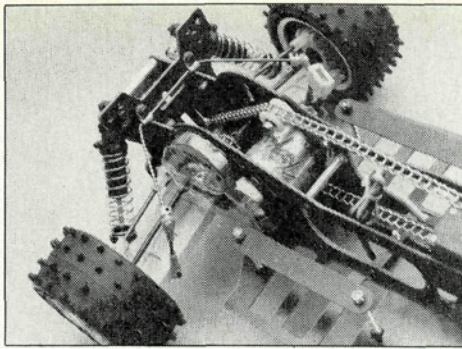


The optional chain-tension idler arm uses bearings inside the nylon pulley. The graphite arm can be easily adjusted by loosening the screw and moving the arm to the correct position. Also note the optional spur-gear hub adapter that replaces the one-piece stock spur gear. The adapter allows the use of any Associated-type spur gear—any pitch, any size.

of maintenance, they should keep things running smoothly.

The chain drive requires little maintenance and, unlike a belt drive, there's no need for dust shields. The down side is that it's relatively noisy. The chain drive also seems to run with less drag than a belt drive does, and it wastes less power than a drive-shaft system. The only thing that disappointed me about the Radiant's chain drive was its chain-tension system. It consists of a plastic pulley with a brass bushing riding on a long screw that's adjusted by moving it up or down in a slot cut in the chassis rail. The screw seemed to bend a little under pressure, and although I haven't had any trouble with it, the potential is there.

The one thing that I don't like (and it's common to most other 4WD cars) is that the wheels are uniquely Pro Radiant. Although the rears are much like those on the RC10 and the JR-X2, the axle hole is larger on the Radiant, so the others mentioned won't fit. The fronts use the same-size six-sided hub design as Kyosho, but again, the axle hole is larger on the Radiant wheels. Perhaps you could drill some Kyosho wheels to accommodate the larger axles, but to be sure that your



The optional sway-bar kit installed here helps to prevent the rear end from shifting too much weight from one side to the other during a turn, which can cause the car to roll.

wheels run perfectly true, you're stuck with Radiant's. To my knowledge, no other third-party wheels are available. I guess you'll have to get used to the gold finish.

PERFORMANCE

My "kit" version of the Radiant wasn't what I usually call stock. I equipped it with the 14-turn Race Prep machine-wound modified motor (the stock kit doesn't come with a motor) and a performance bearing set that replaced the plastic and Oilite bushings. Most people who buy a car of this quality wouldn't assemble it with plastic bushings. I used the modified motor so that the comparison of both Radiant versions would use the same powerplant, thus eliminating that variable. I also used the 32-pitch spur gear that comes with the boxed version, which yielded a ratio of 6:22 (56-tooth spur/9-tooth pinion). This was just about right for the short, tight track I race on.

When I installed a 7-cell SCR stick pack, I discovered that the stock body was designed to accommodate only a 6-cell pack. The 7-cell pack made the car's body bulge on both sides. This didn't seem to hurt performance, but it didn't look right. If I planned to race the car in this configuration, I'd cut out the sides of the body to allow clearance for the longer battery

(Continued on page 150)

PRO PARTS LIST

Graphite, saddle-pack, pan chassis	no. RZ3756
Soft-compound, block-pattern, front tires	no. RP930-s
Soft-compound, block-pattern, rear tires	no. RP928-s
10-piece high-performance bearing set	no. RZ-B
Boost body set with wing and gear cover	no. RZ235
Lexan under-tray kit	no. RZ235-A
Adjustable chain-tensioner idler-arm kit with ball bearings	no. RZ380
Gear-hub adapter	no. RZ-350
Steering-rack kit	no. RZ-385
Rear sway-bar kit	no. RZ-390
Race Prep Pro-2 electrical connectors	no. RP724
Silicone, battery-hookup wire, 13-gauge	no. RP709B
Race Prep machine-wound, 14-turn, modified motor	no. RP-911-14D
TNT computer-matched, 1700mAh, SCE cells	no. RP-7673
Novak T-1 speed controller	

ragin' RADIANT

AYK/RACE PREP PRO RADIANT HOP-UP PRO PARTS

Type 4WD off-road
Scale 1/10
Total Cost \$581.10

DIMENSIONS:

Overall Length 14 inches
Width 9.75 inches
Height 6.5 inches
Wheelbase 10.25 inches
Track (f/r) 8 inches

WEIGHT:

Gross (w/battery) 3 pounds, 8 ounces

BODY:

Type Aerodynamic Boost buggy
w/under-tray
Material Polycarbonate

CHASSIS:

Type Monocoque box/flat-pan
Material Fiberglass and graphite

DRIVE TRAIN:

Type (primary/secondary) Pinion and
spur/chain
Differential Ball
Bearings/Bushings Ball bearings

SUSPENSION:

Front: Type Upper and lower A-arms
Dampening Oil-filled,
coil-over shocks
Rear: Type Lower A-arm/
upper control arm
Dampening Oil-filled,
coil-over shocks

WHEELS:

Type (f/r) Plastic, one-piece
Dimensions (DxW) (f/r) 2x1 inches

TIRES:

Front/Rear Low-profile,
diamond-pattern block

ELECTRICS:

Motor Race Prep 14-turn modified*
Battery 7-cell TNT-matched SCE*
Speed Controller Novak T-1*
*not included in kit

COMMENTS:

This is truly a world-class car! With the options tested, the Radiant is hard to beat. The Race Prep team uses these "trick" parts, and now they're available through hobby shops. The saddle-pack chassis is a welcome addition, as it's much easier to install the radio gear.

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LYNX II

(Continued from page 138)

eat the competition alive.

The stock, Delta-type shock is difficult to assemble properly, and its travel is limited, but with the unique rear suspension, it's tough to beat. When other cars skip around bumpy turns, the Lynx soaks them up with its tires planted on the ground. This is essential for fast lap times, and nothing does it as well as the Lynx II. Don't get me wrong: there's no substitute for driving skill, and this car won't turn you into an overnight success. Cars with good drivers will always give you a run for your money, but if your skills match theirs, the Lynx II will put the odds in your favor.

Is this the perfect car? No way. Just like any other car, it has design flaws that must be addressed. I had some problems: diff side hubs were bent when I opened the box, and the aluminum part of the rear axle bent very easily or came apart where the graphite and aluminum meet. I also broke a couple of the aluminum steering rods.

Should these problems steer you away

(Continued on page 148)

Special FX

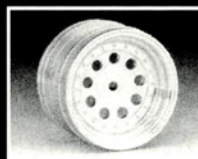
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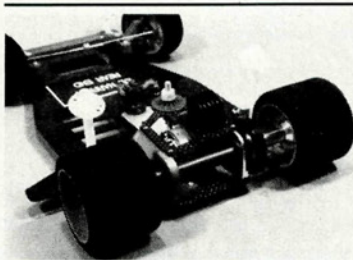
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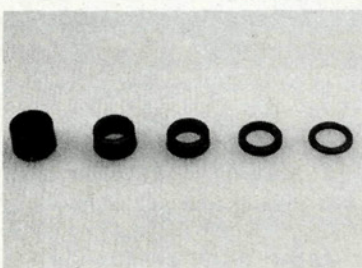
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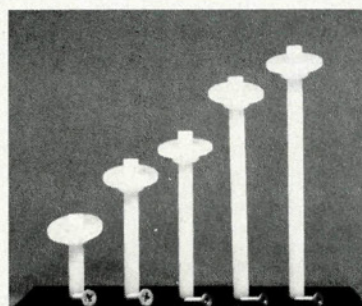
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LYNX II

(Continued from page 146)

from this car? Nope! The Lynx II's distributor is TRC, and their spokesperson told me that they will replace defective parts and are now working on solutions to the problems. It's probable that only a small percentage of Lynx II owners will have these problems, and if this is the price you have to pay for this kind of performance, I say deal with it. There are already many optional parts available for the Lynx II through TRC, and this increases the car's versatility and makes it suitable for a variety of track conditions.

Stay tuned for Project Lynx. I'll be slapping a stock-car body and a number of other "trick" accessories onto it and heading out for some high-speed oval racing!

*Here are the addresses of the companies mentioned in this article:

Composite Craft, 2400 Sand Lake Rd., Orlando, FL 32809.

TRC, P.O. Box 1058, 2211 Charter St., Albemarle, NC 28001.

Andy's R/C Products, 466 W. Arrow Hwy., San Dimas, CA 91773.

Twinn-K, Inc., P.O. Box 31228, Indianapolis, IN 46231.

Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718.

Trinity, 1901 E. Linden Ave., Linden, NJ 07036.

Tekin Electronics, 970 Calle Negocio, San Clemente, CA 92672.

JR-X2 CONVERSION

(Continued from page 120)

of clear polycarbonate. The black material is used for making chassis side plates that help keep dirt out of the truck's vital innards and allow a better airflow around the chassis and the inside of the body. I used the leftover pieces to make a cockpit interior. Use the polycarbonate to make a spoiler or a wing.

THE FINISH LINE

With the finished shell mounted on the truck, I was ready to tackle the nearest off-road battleground, but first, I wanted an expert's opinion of my creation. I took the "assault weapon" to Gil Losi Jr. and asked him what he thought. He looked the truck over for a few moments and then made one simple statement as he checked out the rear H-arms: "You'll probably experience some rear traction problems."

Gil obviously knows what he's talking about, because the "assault weapon" re-

(Continued on page 150)

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JR-X2 CONVERSION

(Continued from page 148)

acted exactly as he predicted it would! Even though the truck was very stable over the jumps and "rough stuff" and was like a bullet down the straightaway, the rear end tried to trade places with the front wheels whenever I tried to power out of a turn!

The stock JR-XT truck works best with the five-link suspension, but I want to experiment with the Losi toe-in and anti-squat kit, shock oils and spring rates. Gil suggested that I try the no. 1 rear pivot supports that come with the anti-squat kit. After all, part of racing is trying different things to find out what works best for you!

*Here are the addresses of the companies mentioned in this article:

Team Losi, 1655 E. Mission Blvd., Pomona, CA 91766

Team Pit Stop, 12233 SW 132nd Ct., Miami, FL 33186.

Pro-Line USA, P.O. Box 456, Beaumont, CA 92223.

A&L Manufacturing, 1490 W. Rincon #J, Corona, CA 91720.

RPM, 14978 Sierra Bonita La., Chino, CA 91710.

Tecnacraft, 1335-B Dayton St., Salinas, CA 93901.

Boca Bearings, 7040 W. Palmetto Park Rd., Suite 2304, Boca Raton, FL 33433.

Twister Motors, 657 E. Arrow Hwy., Suite H, Glendora, CA 91740.

Pocket Rocket, distributed by Twister Motors.

Novak Electronics, Inc., 128-C E. Dyer Rd., Santa Ana, CA 92707.

Airtronics Inc., 11 Autry, Irvine, CA 92718.

JG Manufacturing, P.O. Box 6014, Whittier, CA 90609.

Track Master Mfg., 1466 Pioneerway, Suite 10, El Cajon, CA 92020.

Pactra Coatings, 1000 Lake Rd., Medina, OH 44256.

Dahm's, P.O. Box 360, Cotati, CA 94931.

Venture Racing, 1615 9th St., Lewiston, ID 83501.

Devcon, distributed by Du-Bro Products, 480 Bonner Rd., Wauconda, IL 60084.

Paragon Racing Products, 690 Industrial Circle S., Shakopee, MN 55379. ■

RAGIN' RADIANT

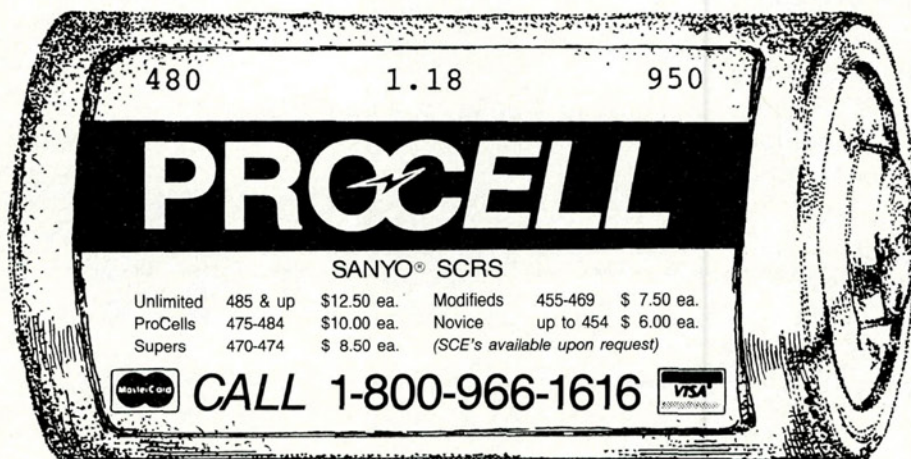
(Continued from page 144)

pack. This would destroy the sharp-looking lines of the stock body, but it would be more functional.

The car had a considerable amount of understeer going into the corners, oversteer coming out, and a tendency to traction roll. I adjusted the suspension and eliminated most of the handling problems, but the car still tended to roll.

When the handling problems had been corrected, its lap times were very good, and to confirm what the clock told me, I set up an informal contest between the Radiant and a well-tuned Tamiya Avante

(Continued on page 152)



WE'RE LOOKING FOR AN R&D MANAGER

For radio-control and slot-car manufacturer—must have racing, systems and administrative experience. Needs to be able to function as part of an energetic management team with emphasis on results.

Must be able to spend some weekends at races, and devote many hours to accomplish our goals.

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13927 Progress Pkwy, N. Royalton, OH 44133

RAGIN' RADIANT

(Continued from page 150)

that was equipped with a similar motor wind. The Radiant was quicker through the turns and seemed to have a slight advantage down the straights, and this gave the it an average two-lap advantage over the Avante after 4 minutes. The Radiant also handled the jumps and bumps much better than the Avante. Overall, the performance of the Pro Radiant boxed kit was more than satisfactory.

HOP-UPS

The anticipation of how the car would perform with the other hop-up parts installed was almost unbearable. I couldn't wait to tear down the car and install all those goodies. First, I installed the steering-rack kit, and it wasn't easy. This option helps to eliminate bump-steer, and it makes the steering more precise by keeping the wheels parallel in a turn.

The kit consists of a graphite rack bar and ball links. The rack bar is mounted to the stock servo-saver arms, and the ball links are screwed into the ends of the rack. The supplied balls had very long, threaded shafts that had to be cut and filed flush with the top of the rack so that they wouldn't catch on the servo-saver arms. This left very little material to hold the balls in place, so I used some thread-locking compound for extra insurance. I hope they don't come loose, because I'll have to disassemble the entire chassis to install or replace them. This would be no small task if I wasn't already taking the car apart to rebuild it with hop-up parts.

Next, I assembled and installed the graphite chassis plate, which consists of a flat-pan chassis with seven battery slots to accommodate saddle-pack-type batteries and a simple battery holder. This should make the biggest improvement in performance, because it lowers the center of gravity to below the wheel axis. I did have some problems, though. There wasn't enough room for the radio gear. The stock radio plate had to be removed so that the Boost body and the under-tray fit closely to the chassis rails, and this left no room for a standard-size receiver or speed controller. I eventually used a Novak* mini-receiver mounted on the side of the chassis rails, and, as the instructions recommend, I mounted the speed controller between the chassis rails under the chain's path. Note that the antenna mount is also eliminated when the battery tray is

(Continued on page 154)

Show Flake

The first "metal-flake" in a can



Now you can really show off with three exciting "metal-flake" finishes: silver, gold, and multi-color. *Show Flake* is an aerosol, it's quick and easy, no messy air-brush to clean. Just spray it on, then paint. *Creates no radio interference.* Be as creative as you dare!

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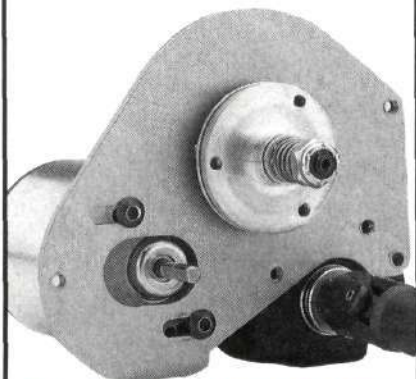


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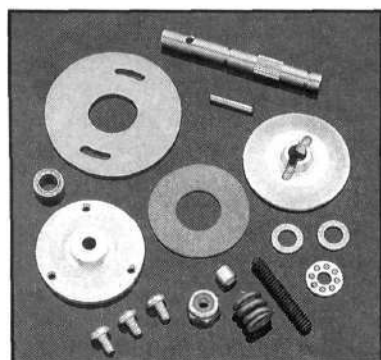
Power Clutch

A&L's new Power Clutch takes you beyond the ordinary "slipper".



The New Power Clutch from A&L will improve handling and lap times by eliminating fish-tailing and spin-outs off the line and in the corners!

- Eliminates destructive torque, saving tranny idlers and gears, dog bones and spur gears
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RAGIN' RADIANT

(Continued from page 152)

removed. I used a blank, Associated*, nylon servo mount and drilled a hole to fit the antenna mast, which I then mounted to one of the chassis rails. I filed the new chassis so it would clear the bottom of the existing chassis rails and fit flush with the gearbox housings. I'm not convinced that this is necessary, but I did it anyway.

Next, I installed the adjustable chain-tensioner, which was a definite improvement over the stock setup. It has ball bearings to keep the idler pulley from wearing and binding on its shaft, and it makes it much easier to adjust the chain tension.

The last parts to be installed on the chassis were the sway-bar kit and the spur-gear adapter. The sway-bar kit is easily installed, but it requires that a hole be drilled in each of the rear, lower suspension arms. The spur-gear adapter replaces the stock 56-tooth/32-pitch special spur-gear assembly with a unit that will accept *any* standard Associated-type spur gear. I went with a 48-pitch combination (15/90) that yields a 6:1 ratio, which is just slightly higher than that used in the boxed kit configuration. The last two hop-up installations were the soft-compound, diamond-block tires and the TNT computer-matched batteries. The TNT SCE computer-matched batteries were made into a 7-cell saddle pack for the new chassis. I also used the famous Race Prep Orange Connectors for the battery-to-speed-control hookup.

WORLD-CLASS PERFORMANCE

The Pro Radiant worked well in its out-of-the-box form, and with all the hop-up parts installed, it turned into a screamer. Although I haven't entered any formal competitions with the car, so far, there hasn't been much to challenge it. The parts all function as expected, and most of the shortcomings of the box-stock version have been eliminated. Because of the new chassis, the over/understeer and rollover problems are gone. The clock shows a 0.3-second-per-lap advantage over the original kit, and that was confirmed by the amount of dirt that it kicked up. Now I understand why Mike Dunn did so well at the World's among all those fancy factory rides.

If you want a car that's like the one Mike drove, be prepared to spend some big money. By the time you get through, the cost will be close to \$600 for the kit and the parts. Since no part is outrageously

expensive, you could buy them one at a time and upgrade gradually. I can't wait for the season to really get rolling so I can avenge some of last season's losses to Cats, Opts, and YZs.

*Here are the addresses of the companies mentioned in this article:

AYK Racing/Race Prep, 20115 Nordhoff St., Chatsworth, CA 91311.

Novak Electronics, 128-C E. Dyer Rd., Santa Ana, CA 92707.

Associated Electrics, 3585 Cadillac Ave., Costa Mesa, CA 92626.

TRACK DIRECTORY

In keeping with our constant efforts to help foster the growth of the radio-control car hobby, we print this track directory intermittently to inform modelers where they can race and exchange ideas. If you'd like your track listed, send the track's name, address and phone number to **R/C Car Action Track Directory**, 251 Danbury Road, Wilton, CT 06897. We'll list as many clubs as space allows.

CALIFORNIA

ARO HOBBIES

24275 Sunnymead Blvd., Moreno Valley
(714) 924-3240

HOBBY HAVEN RACEWAY

3983 First St., Livermore, 94550
(415) 443-7862

SANTA MONICA R/C RACING CLUB

1660 Stewart St., Santa Monica
Glen Williams (213) 734-7888
Chris Chan (213) 393-3735
Tom Wong (213) 821-5472

R/C RACEWAY

6326 Main Ave., #7, Orangevale, 95662
(916) 988-5368

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510 Dado St., San Jose, 95131
(408) 434-9385

CAJON R/C SPEEDWAY

1875 Joe Crosson Dr., El Cajon, 92020
Race Schedule Hotline (619) 449-0788
Track Information (619) 449-9948

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8711 Elder Creek Rd., Sacramento, 95826
Paul & Marge Schiager (916) 383-4011

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Sandhill Ranch, Brentwood
(415) 757-6594

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5631 W. Lone Tree Way, Antioch, 94509
Jack Hanson (415) 754-5700

ELECTRIC OFF-ROAD RACEWAY

1801 Springs Rd., Vallejo, 94590
(707) 557-0302

GROUND ZERO RACEWAY

P.O. Box 1232, NAS Lemoore, 92345-1232
Craftech (209) 998-3137

HOBBY BENCH RACEWAY

515 S. Glendora Ave., Glendora, 91740
(818) 963-9517

(Continued on page 186)

WHAT'S NEW



HYPERDRIVE CAM Stock Motor Brushes

These replacement brushes for CAM stock motors are made with the same compounds as their modified-motor brushes and are the only recommended replacements for the new-style CAM stock motors.

Part no. MO 0201

Price: \$4/pair



Ultima On-Road Conversion Kit

With this kit, you can convert your Ultima into a super-high-performance, on-road/oval racing car with very predictable handling characteristics. The chassis has the race-proven, beam front-axle design used on the Hyper 10 on-road car, and prototype cars using this kit have broken track records everywhere. The kit is easy to set up and has a stick-battery format (instead of saddle packs), a chassis, shock mounts, a front axle, steering blocks, a bumper and battery trays.

Price: \$99.95

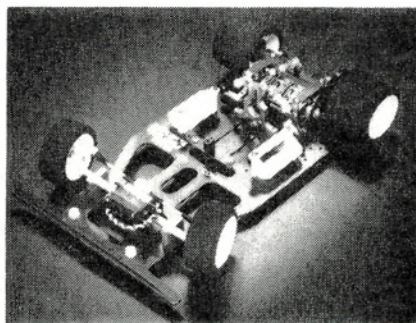


RC10 On-Road Conversion Kit

Transform your off-road RC10 into an awesome, mid-engine, on-road/oval racing car with this kit. The chassis has a

Hyper 10, beam front-axle design, and cars using this kit have consistently broken track records. It realigns rear toe-in for superior on-road performance. The kit has stick batteries, a chassis, shock mounts, a front axle, steering blocks, a bumper, battery trays and all the necessary hardware.

Price: \$99.95



Burch Signature Series Hyper 10

These limited-edition Signature-Series Hyper 10s come fully assembled and tweaked by Ralph Burch Jr. and Snuffy Smith, and the numbered chassis have Burch's signature. The aluminum parts have been buffed to a lustrous sheen. This new Hyper 10 is 3 ounces lighter than the original, and it comes with trued, racing-width tires already mounted; you add only a body and the electrics.

Price: \$549.95

For more information, contact Hyperdrive Racing Systems, 3210 Howard Nickell Rd., Fayetteville, AR 72703.



BULLET RACING YZ-10 Upper Plate

Bullet's YZ-10 upper plate increases the strength and stability of your chassis plate and makes your shocks work for you.

Price: \$19.95

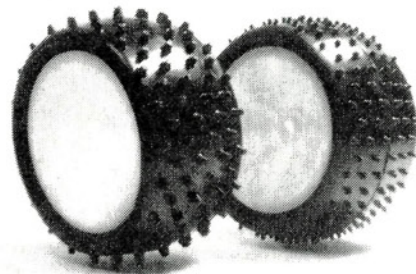
For more information, contact Bullet Racing Products, Inc., 14435 Tomball Pkwy., Houston, TX 77086.



SPEEDWORKS 427-4WD

Low-end torque and high rpm are required of a 4WD motor, and this is exactly what you get with the 427. This motor was designed to overcome the defects of the power-robbing transmissions found in 4WD off-road cars. It has 2.0 two-stage wet magnets; dual ball bearings; adjustable timing; and a 16-turn double-wind motor that produces 36,000rpm. It fits all 4WD off-road cars—YZ-10, Cat XLS, Mid, Dominator, etc.

Price: \$39.99

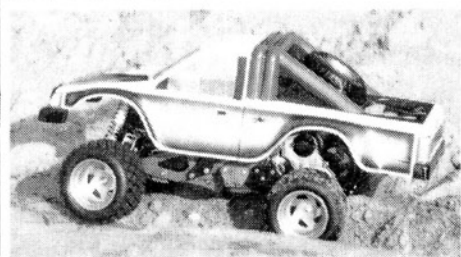


TRINITY 2.2-Inch Rear Wheels & Tires

The 2.2-inch-diameter rear wheels and tires that you heard about at the Off-Road World Championships are now available to everyone! Trinity offers these high-bite, natural-rubber tires in two compounds and two spiked patterns. The wheels fit the JR-X2, the RC10 and the Ultima. These low-profile, large-diameter tires provide more traction and work well on rough tracks.

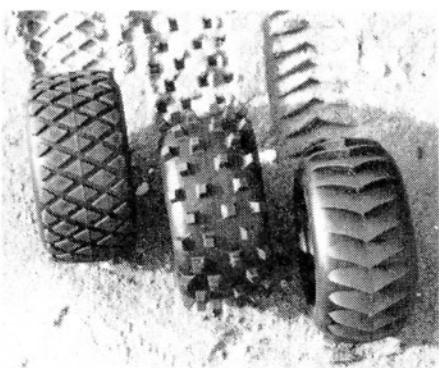
Price: \$6.99 to \$9.99

For more information, contact Trinity, 1901 E. Linden Ave., #8, Linden, NJ 07036.



TMS Mazda Truck Body

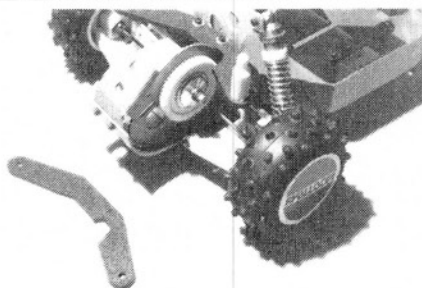
This new, Mazda, off-road, truck-body shell has all the details molded in. Made of tough G.E. (.040-inch) Lexan, it's a sturdy performer. K.C. high-beams, a double roll bar, flared fenders and a spare tire are just a few of its features. It's designed to fit comfortably on Blackfoots, Monster Beetles and JR-X2 and RC10 truck conversions.



Performance Tires

In an effort to develop a suitable tire for all-terrain, off-road and deep-mud-bog vehicles, TMS Products has designed three, new, high-performance tires. The versatile Diamond All-Trac (no. 2210) performs well on all hard surfaces—dirt and pavement. The Square Spike Off-Roader (no. 2211) is for those who need positive off-road traction. (They dig in when nothing else will.) The Mud Digger (no. 2212) was developed just for truck-pulling and was derived from a V-tread design that's found on full-scale professional pullers.

For more information, contact TMS Products, 1948-A Del Amo Blvd., Torrance, CA 90501.



McALLISTER RC10 Rear Body Mount

This compact, light, RC10 rear body mount positions your body posts for your stock car or truck bodies.

Part no. A-434

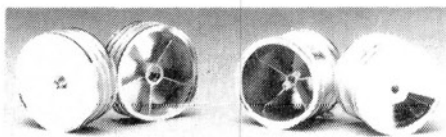


Straight-Line Fever

Don't blink, or you'll miss these sleek pro stockers in the scale quarter-mile. McAllister Racing's Firebird, T-Bird and Lumina bodies have a Pro-Stock aero scoop molded-in, and they fit 1/10-scale chassis of standard width.

Part nos. B-140 (Firebird); B-139 (T-Bird); B-138 (Lumina).

For more information, contact McAllister Racing, 2245 First St., Unit 105, Simi Valley, CA 93065.

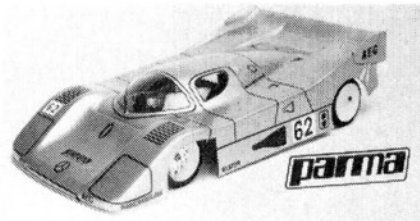


PRO-LINE Chrome Wheels

Pro-Line introduces the newest high-performance, light wheels in white nylon (which can be dyed), chrome and neon. They all have a 2-inch diameter.

Part nos. 25478 (front chromes): \$7.95/pair; 2548 (rear chrome): \$7.95/pair; 2549 (front, narrow, "dyeable" 4WD for original Kyosho kits): \$5.95/pair.

For more information, contact Pro-Line, P.O. Box 456, Beaumont, CA 92223.



PARMA Pro-Series Sauber Mercedes

Parma combines aerospace technology and wind-tunnel testing to bring you Parma Pro-Series Racing Bodies. The first is the 1/10-scale Sauber Mercedes, with its sleek, sweeping lines and low profile. For maximum downforce and minimum drag, every surface has been designed to funnel airflow to the rear wing. This land missile has been created to do one thing: win races.

Price: \$19



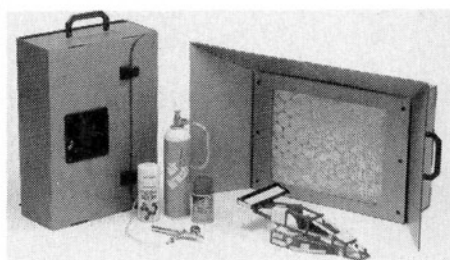
1/10-Scale Sport Truck Kit

Be the first in your neighborhood to cruise the streets in style with the brand-new Parma California Sport Truck Kit. This rolling-chassis design includes: a ball-type diff; a steel axle; aluminum rear hubs; a heat-sink-type, aluminum rear pod; fiberglass chassis components; chrome BBS wheels and ultra-low-profile tires; kingpins; mounts; adjustable steering linkage; the Parma "non-visible" body-mounting system; a high-quality, exploded-view instruction sheet; and a crystal-clear Chevy truck body, complete with ground effects and decal sheet! It's all packaged in a sporty box with a convenient carrying handle.

Price: \$99.95

For more information, contact Parma International Inc., 13927 Progress Pkwy., North Royalton, OH 44133.

WHAT'S NEW

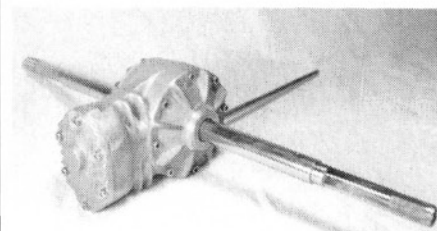


ZED GROUP Freedom Filter

This portable spray case traps and filters over-spray, fumes and dust, and it can even reduce or eliminate odors. Freedom Filter's 20-watt suction fan draws droplets, particles and gases through a four-stage filter system to free your eyes, lungs, skin and other nearby surfaces of airborne pollutants. Freedom Filter's electrical cord and detachable hood fold to fit inside the unit. The 12x5 1/2 x 17-inch metallic-gray plastic case weighs 4 pounds.

Price: \$89

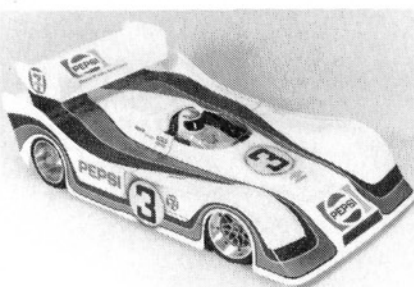
For more information, contact ZED Group, IMC, Box 6475, Chelsea, MA 02150.



H&L AUTO BODY Quick-Change Rear

H&L's 1/4-scale Quick Change rear end is heat-treated and has machined housing for close tolerances. Its all-ball-bearing construction provides smooth, quiet operation, and a gear lubricant ensures continuous lubrication of bearings and gears. Ring-and-pinion gears are hardened steel in either a 7.17:1 or 3.66:1 ratio. The quick-change brass gears are hex-broached and slip-fit to a hex pinion. Five gear-change sets are available and, by reversing the gears, 10 ratios are possible.

For more information, contact H&L Auto Body, 2238 Academy, P.O. Box 153, Sanger, CA 93657.



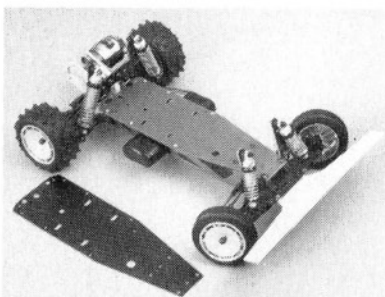
ASSOCIATED TOJ Can Am Body

This 1/10-scale, Associated, TOJ Can Am car body faithfully recreates the details of the original winner—including its smooth, aerodynamic lines that were designed to hug the ground and cross the finish line in first place.

Price: \$18

Part no. 6178

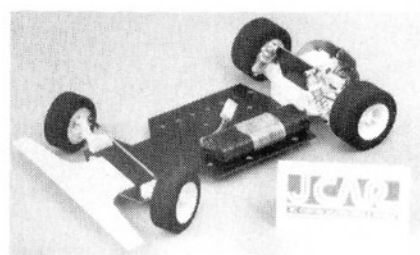
For more information, contact Associated Electrics, Inc., 3585 Cadillac Ave., Costa Mesa, CA 92626.



J-CAR Ultima Chassis Plate

This Ultima chassis plate was designed to remedy three of the inadequacies usually found with these parts. First: J-Car's solid plate won't bend or brake, so it strengthens your Ultima's front end. Second: it gives you a solid area on which to attach the speed controller and receiver with servo tape. Third: the battery tie-straps are inboard, so they won't break if your car crashes. Available in black, blue and red.

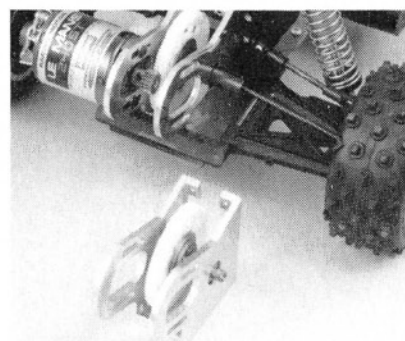
Price: \$19.95



RC10/Ultima On-Road Chassis

Turn your dirt car into a competitive asphalt/carpet car with this J-Car chassis. Remove the rear end of your RC10 or Ultima, install it on the J-Car chassis with an Associated 12L front assembly and foam tires, and you'll be ready for the road. This chassis is designed to be used with flat, 6- or 7-cell packs, and seven battery locations allow you to distribute the weight to suit any track. The chassis comes in red, blue and black.

Price: \$36



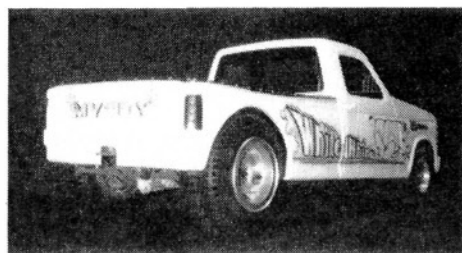
DDS Transmission

Now you can own a light, efficient, easy-to-maintain transmission for the Kyosho Ultima and the Associated RC10. J-Car's DDS transmission comes with either the stock Turbo Ultima differential or the Thorp Ultima differential. It can be set up to use 32-, 48-, or 64-pitch Robinson racing gears or the Hyperdrive belt-drive system. The DDS transmission is excellent for dirt-oval, off-road and asphalt racing, and the motor can be mounted on either side to suit a variety of tracks. Gear ratio ranges from 2.64:1 to 7.20:1.

Price: \$80

For more information, contact J-Car, 52 Perkins Ave., Norwich, CT 06360.

WHAT'S NEW



DEGREE MFG. Mytoy

Degree Mfg. introduces the first in a series of Mytoy trucks. The P.T. 2000 is a high-quality 1/4-scale pulling truck that comes with an H.D. Echo 21cc engine; a reduction gearbox with interchangeable gears; an enclosed drive shaft for maximum strength and safety; a Skellenger quick-change rear end that allows ratios from 1:1 to 30:1; 11x4x5-inch pneumatic tires; and a reinforced, fiberglass body. Pulling sleds are also available.

Price: \$1,795

For more information, contact Degree Mfg., 8614 Argent St., Suite A, Santee, CA 92071.



STAGE III Dragin' Wire

Designed for the typically huge currents and high voltages in truck pulling, drag racing and power boating, the capacity of this 12-gauge wire is 33 percent greater than Super 13, and it has the same high-quality features: the purest copper stranding, electroplated tin for fast soldering and corrosion-resistance, 1,660 superfine strands for incredible flexibility, and burn-proof soft-silicone insulation. Packaged with 2 feet each of black and orange, silicone-coated, 12-gauge wire.

Price: \$7.50

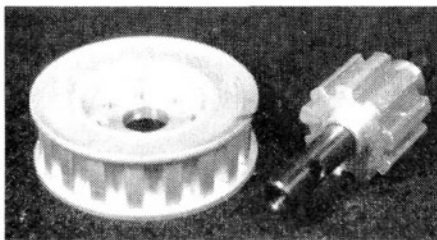


Cell-Shrink

Designed for all R/C applications, this clear, super-strong heat-shrink material provides additional insulation against shorts, but doesn't trap air around the cells. Superglues can be used without permanently damaging the original manufacturer's heat-shrink!

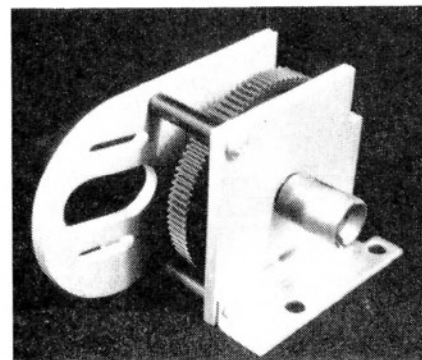
Price \$2.25/24 pieces

For more information, contact Stage III, 1189 Chicago Rd., Troy, MI 48083.



TRACK MASTER Turbo-Glide

A direct replacement for 2.25:1 gears, these new 1.8:1 gears give stock-class racers the ratio they need to win. They use the existing belt, and modifications aren't necessary.



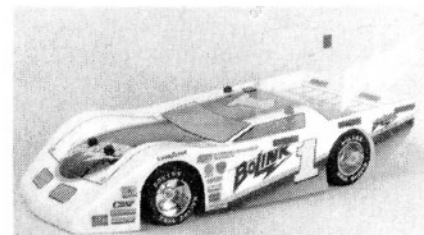
X-Caliber Direct-Drive

Designed for efficiency and simplicity, the X-Caliber is one of the best direct-drive systems and meets the needs of both professional and weekend racers.

It's recommended for long, high-traction dirt ovals or roadcourses.

Prices: \$94.95 (Aluminum RC10); \$109.95 (Graphite RC10); \$94.95 (Aluminum Ultima); \$109.95 (Graphite Ultima).

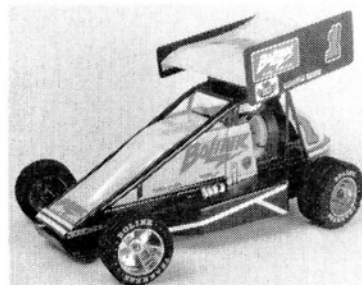
For more information, contact Track Master, 1466 Pioneer Way, #10, El Cajon, CA 92020.



BOLINK Corvette Devastator

Bolink's Corvette Devastator dirt-oval body is designed to be a major contender on tracks around the country. Its sleek, aerodynamic design just begs to go fast.

Price: \$18



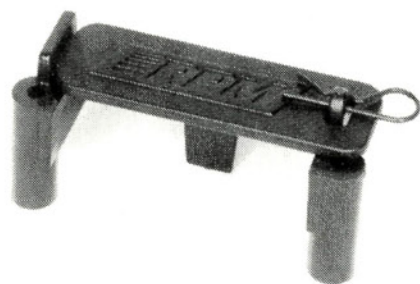
Challenger Sprint Car

Based on the popular Outlaw Sprint car and available in several styles, the 1/10-scale Challenger Sprinter body should be popular on dirt tracks everywhere. No. BL-2344 comes with side bars; no. BL-2344-A comes with molded side pods and wing kit; no. BL-2345 has molded side pods to cover most of the chassis; and no. BL-2345-A has molded side pods and a wing kit.

Price: \$18 to \$22

For more information, contact Bolink R/C Cars, 420 Hosea Rd., Lawrenceville, GA 30245.

WHAT'S NEW



RPM JR-X2 & RC10 Battery Box

Here's a new, two-piece, molded battery box that's slightly wider so it accepts "stack" batteries. The lid fits easily into a molded slot on one end and is held firmly by a hitch-pin on the other. Pull the pin, and the lid lifts off completely to give easy access to the battery. Side and front openings are molded-in, so the battery lead can exit almost anywhere. The battery box comes complete with mounting screws, hitch-pin and easy-to-understand instructions.

Part no. 7050

Price: \$5.95

For more information, contact RPM Custom Engineered R/C Products, 14978 Sierra Bonita La., Chino, CA 91710.

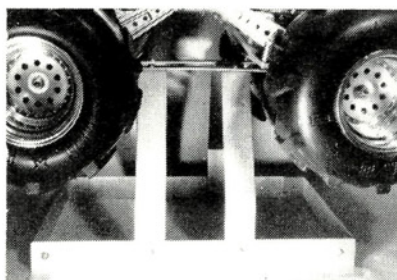


RPM Lightweight Bullet A-Arms

RPM's new front and rear A-arms for the Traxxas Bullet are stiffer, stronger and lighter than the Bullet's stock arms, and they have better shock and hinge-pin alignment. For easy access, the shock pivot can be mounted from the front with 4-40x3/4-inch screws. The rears are pushed back slightly to align the axles 90 degrees to the gearbox, thus making the car 1/8 inch longer. All RPM products are guaranteed not to break.

Part nos. 7220 (\$11.95); 7225 (\$11.95); 7230 (\$19.95).

For more information, contact RPM Custom Engineered R/C Products, 14978 Sierra Bonita La., Chino, CA 91710.

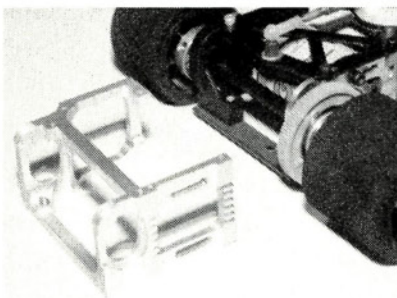


ESP Clod Buster Work/Display Stand

ESP's new, lightweight, aluminum stand effectively supports the Clod Buster so that you can easily make steering or speed-control adjustments. This stand also serves well as a mount to display your Clod Buster.

Price: \$29.95

For more information, contact ESP, 7105 Virginia Rd., Crystal Lake, IL 60014.



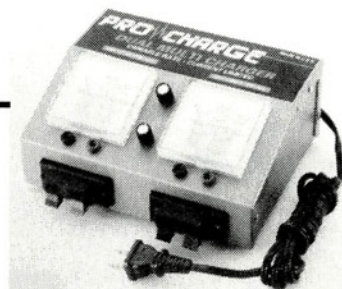
HOBBY ETC. 12L Pod

This unique, one-piece pod is made of superlight 6061 alloy and provides an extremely rigid motor mount that allows efficient cooling for your valuable motors.

Part no. GPM L12

Price: \$69.95

For more information, contact Hobby Etc., 295 D.W. Hwy., Nashua, NH 03060.



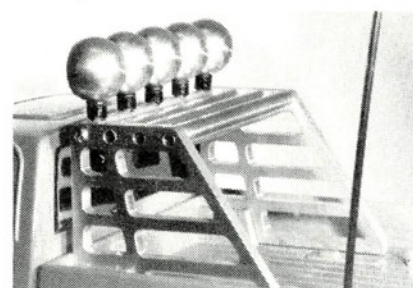
WORLD ENGINES Pro-Charge Dual Multi-Charger

The Pro-Charge Dual Multi-Charger slow-charges two battery packs simultaneously. The charging circuits run independently and have separate current adjustments. The charging currents have a current limiter, and both battery terminals are protected from reverse-polarity installation. The voltmeter jacks on the front panel enable you to use the charger, which has a durable aluminum case and large, easy-to-read dials.

Part no. 10945

Price: \$109.95

For more information, contact World Engines Inc., 8960 Rossash Ave., Cincinnati, OH 45236.



ESP King Clod Quad Roll Bar

This Clod Buster Quad Roll Bar consists of four all-aluminum tubes and two machined-aluminum side plates. Optional accessories: Lighting Mounting Bar (\$4.95); Roll-Bar Lights (\$24.95/pair).

Price: \$49.95

For more information, contact ESP, 7105 Virginia Rd., Crystal Lake, IL 60014.

Descriptions of new products appearing on these pages were derived from press releases supplied by the manufacturers and/or their advertising agencies. The information given here does not constitute endorsement by Radio Control Car Action, nor guarantee product performance or safety. When writing to the manufacturer about any product described here, be sure to mention that you read about it in Radio Control Car Action.

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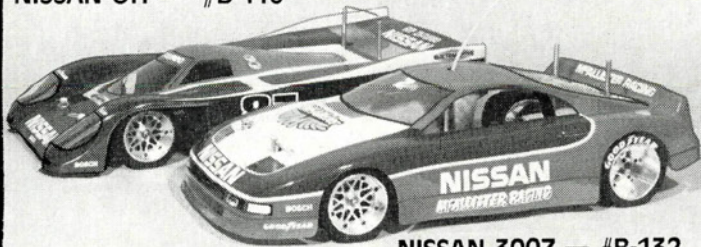
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Lance Reynolds (305) 282-8540

(Continued on page 192)

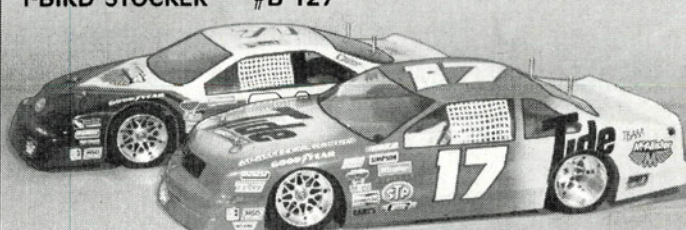
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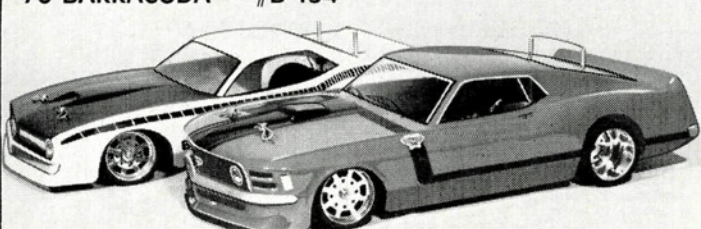
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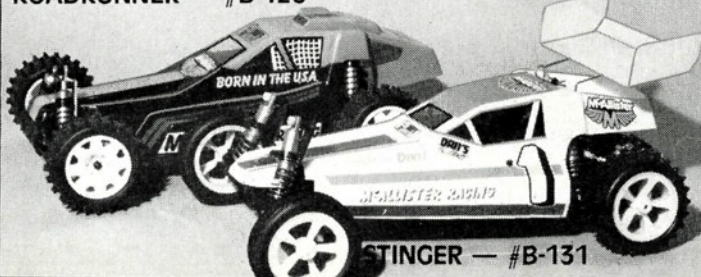
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(Continued from page 187)

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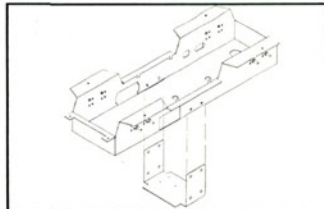
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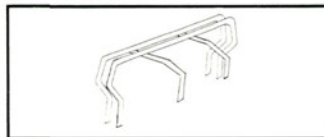
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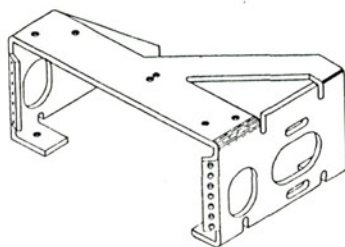
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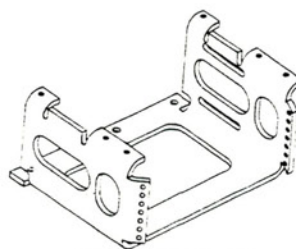
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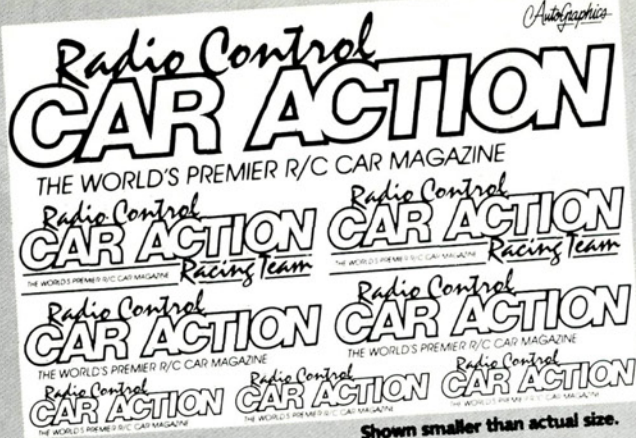
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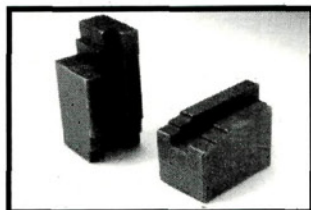
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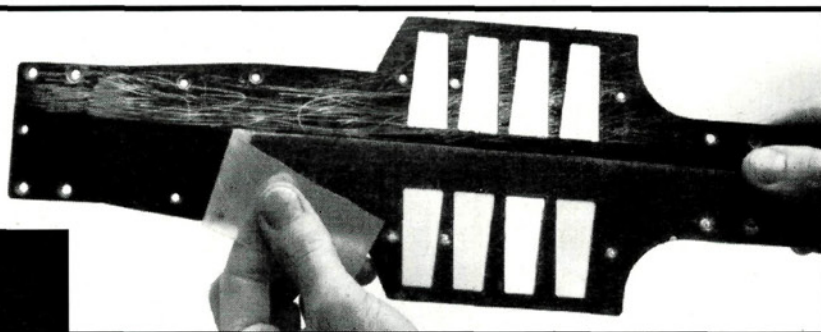


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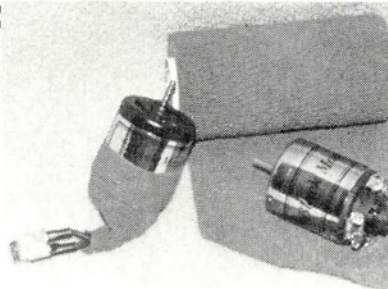
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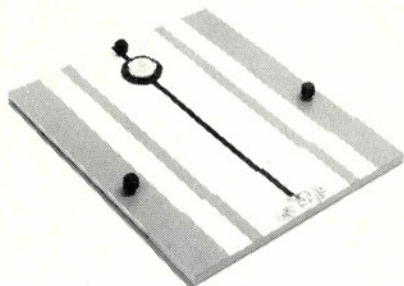
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Here's your chance. We're expanding **Radio Control Car Action** and are looking for additional contributors to help us accomplish this objective. Of key importance are good photographs; the writing we can help you with. Interested? It's much easier than you might think!

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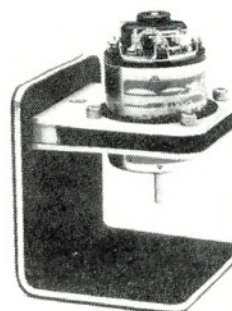
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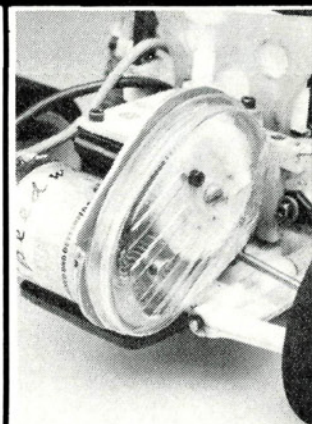
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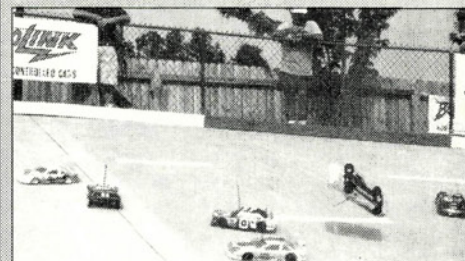
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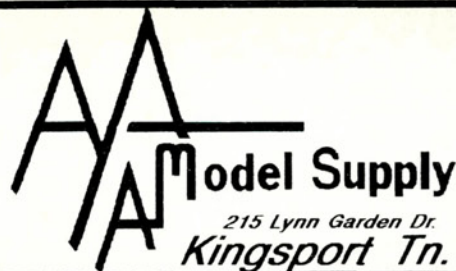


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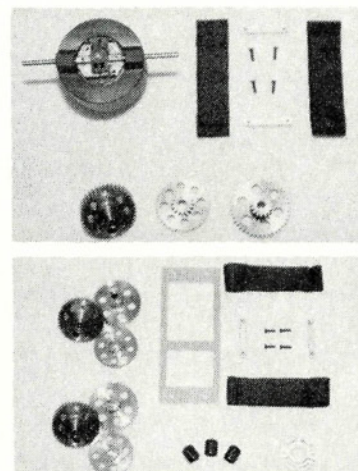
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